January, 1948 Vol. 37, No. 1

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

The Shop Teachers' Professional Magazine

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IN THIS ISSUE

* Industrial Arts and the Core Curriculum — *Robert W. Cynar*

* Presenting a Course of Elementary Metallurgy to Apprentices — *Lester P. Spencer*

* Some Leaders in Industrial Education — *William T. Bawden*

* The General Library and the School Shop — *Howard O. Reed*

* Problems in Supervision and How to Meet Them — *Walter B. Jones*

* Teaching Materials for Industrial Education — *Chris. H. Groneman*

R v. 37 1948

THE CONTROL THAT BRINGS HIM SAFELY HOME

International News Photo

THE papers have been full of stories about planes without human pilots, controlled by radio impulses. A 4-engine Douglas transport plane without a pilot has taken off from this country, negotiated the treacherous and dangerous air currents over the Atlantic, the blinding fogs, all the unpredictable hazards of flying, set the plane down safely in England and brought it back safely to America.

Somehow this story echoes the story of the career-to-be of men-to-be. With certain preparations made, certain controls established, educators launch these youngsters into flight, to cross the ocean of adult life, to buffet the treacherous currents of adverse and unpredictable influences, to come safely to rest at the end of a long and honorable career. But only when *right* preparations are made and *right* controls established can they be sanguine of successful flight. Educators must establish influences that will control, will steer, will *steel* these youngsters against the unknown. The controls and guides are the standards, the ambitions, the habits of thought, the clarity of thinking, the strength of purpose, the ruggedness of character that can be developed in every student.

This is the educator's responsibility and the years during his contact with students his opportunity. No educator worthy of the name will disclaim his responsibility but shoulder it to the full. How are these controls established? Only by their formation in the schoolroom. No educator has greater opportunity to establish habits of right thinking, of clear thinking, of strength of purpose, of high standards, of unfaltering ambition than the instructor in mechanical drawing. Here is the study that abuts so closely on one of the most honorable careers in the world. Here he can cite as examples and inspiration the deeds of great engineers. Here he can appeal to the creative desire that is instinct in all. Here the boy uses tools of precision, tools of creation, tools that link hand and brain and reflect back into moral standards. Here is an opportunity without equal. Shall the instructor cast it away through carelessness on his part, through lack of respect for his subject or its tools? Can he say it does not matter what drawing instruments the young student will use? The risk attending such negligence is great. The need for such negligence does not exist. The thoughtful instructor *demands* his students have the best drawing instruments it is possible to buy.

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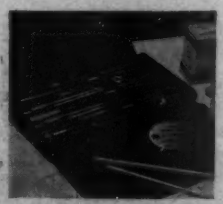

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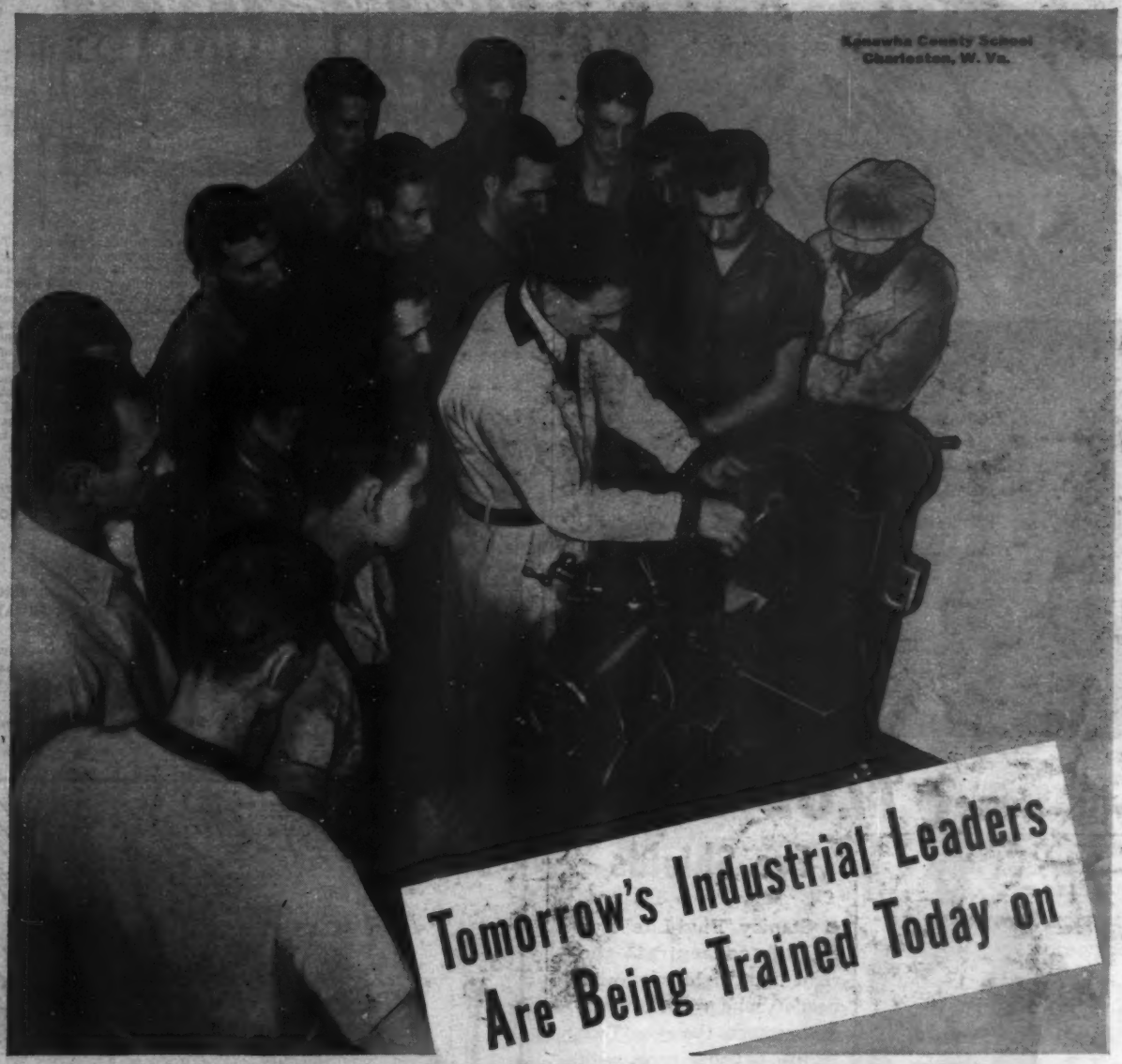

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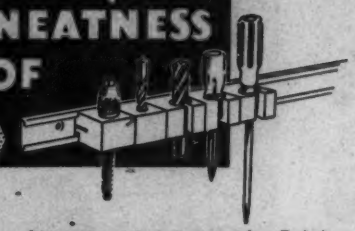

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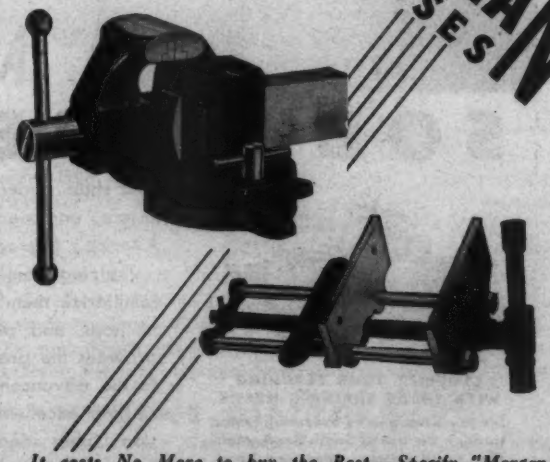

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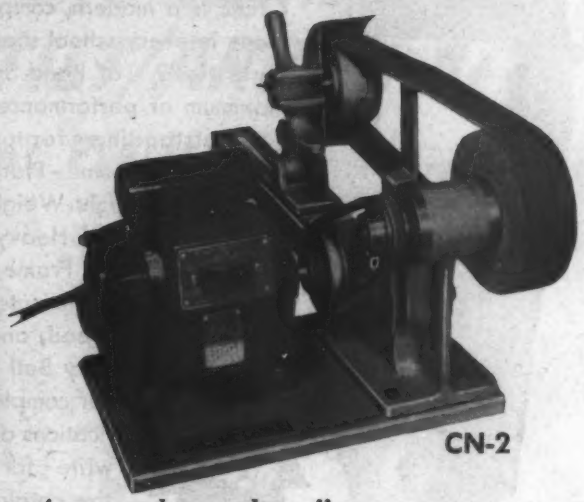

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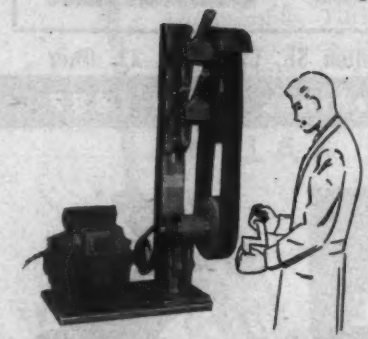

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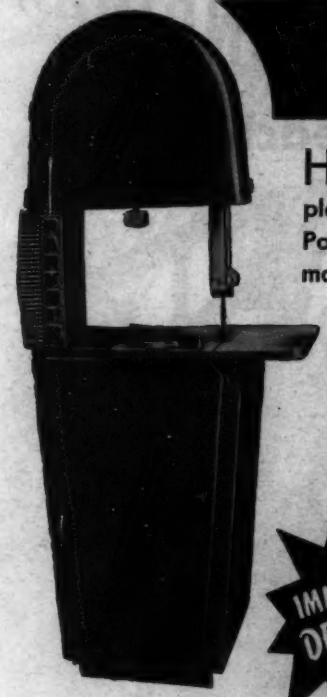

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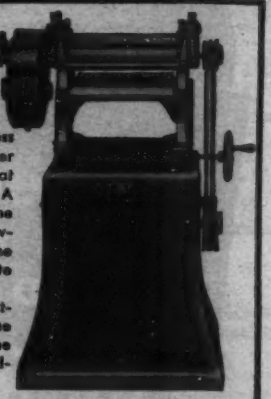

A compact, sturdy, thickness planer that offers mill planer precision and ruggedness at a sensationally low price. A real heavy-duty machine that will pay for itself in savings effected through the salvage of otherwise waste stock.

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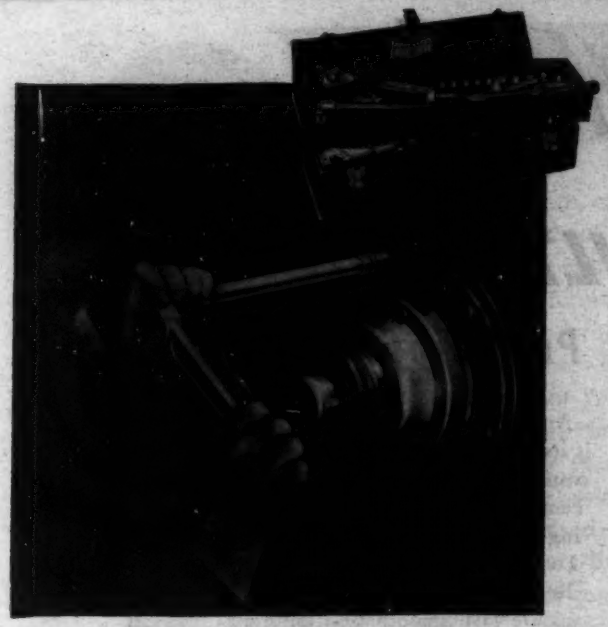

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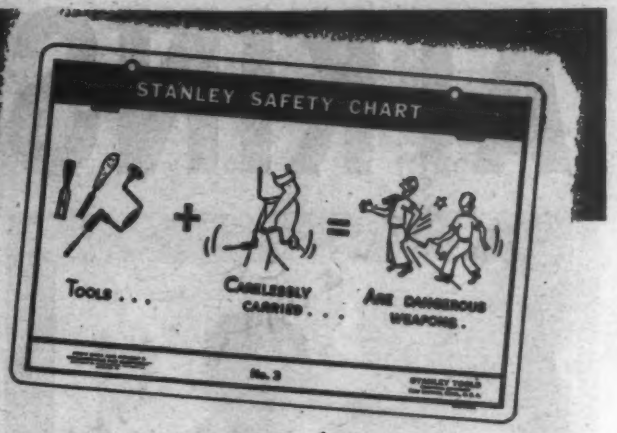

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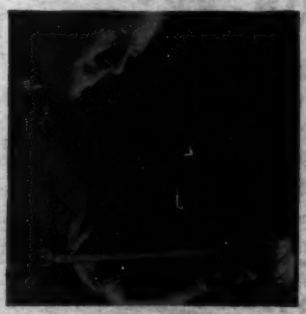
"KNOW YOUR FILES and GET AHEAD"

is good advice to the mechanical training student. This is the first of a series of technical data on files that will prove helpful to instructors. Save this page for your loose-leaf binder.

BRASS FILE

FLAT BASTARD FILE



FILING BRASS

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Industrial Arts and Vocational Education

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TABLE OF CONTENTS

Industrial Arts and the Core Curriculum ..... *Robert W. Cynar* 1
Presenting a Course of Elementary Metallurgy to Apprentices ..... *Lester P. Spencer* 2
Safe Winter Driving Tips 4
Some Leaders in Industrial Education ..... *William T. Bawden* 5
English for Trade and Vocational Schools ..... *J. Allen Morris* 7
The General Library and the School Shop ..... *Howard O. Reed* 9
Problems in Supervision and How to Meet Them ..... *Walter B. Jones* 10
Printing as a Part of Occupational Therapy ..... *Albert Pascal* 12
Vocational Education and Society ..... *Thomas Diamond* 13
Editorials 16
Student Characteristics and Progress .. *Edward K. Hankin* 17
Teaching Materials for Industrial Education ..... *Chris H. Groneman* 19
Joseph Sandberg — 1871–1947 ..... *Emerson Staebner* 22

Problems and Projects

Jardiniere or Copper Dish ..... *Homer C. Rose* 23
Round Plastic Picture Frame ..... *Chris H. Groneman* 24
A Traffic Officer Is Needed 25
Coat Hanger ..... *Howard W. Broere* 25
Center Squares ..... *P. W. Blandford* 26
Aeronautics ..... *William E. Nagel* 27
Handy Finishing Cabinet ..... *Walter O. Hayes* 28
Devices That Aid in Shop Management ..... *H. A. Allender* 29
Electrical Installation and Practice — An Instruction Sheet ..... *Elmer C. O'Donnell* 30
Indian Silversmithing ..... *Ben Hunt* 31
Footstool ..... *George Brittain* 34
Interesting Items About Mahogany 34
Revamping Pencil Sharpener for Pointing Up Drafting Room Pencils ..... *R. E. Murray* 34
The Potter Begins ..... *Elmer A. Morrow* 35
A Handy Drafting Case ..... *Bergen Dewees* 38
Wind Turbine — A Beginning Sheet-Metal Problem ..... *John C. Klier* 39
Useful Teaching Aids ..... *William H. Appeldorn* 39
Trade Department Award Plaques ..... *John W. Titus* 40
Cup and Saucer Rack ..... *Oliver P. Eitzen* 14A

Personal News 16A
Association News 19A
Questions and Answers 22A
News Notes 22A
New Publications 23A
Shop Equipment News 26A

This Festive Season

This issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will reach you while you are still preparing for Christmas. It is, therefore, perfectly appropriate, even though this is the January, 1948, issue, to wish all of you a very merry Christmas.

For the new year — we hope it will be filled for all with the greatest happiness, and that that happiness will gradually spread over the entire world. As it is, peace is still an unknown quantity in the countries in which raged World War II.

It is to be hoped that the year 1948 will change all this, and that peace between nations again will become more than a figure of speech. It is also to be hoped that when peace has been established, the world will be able to enjoy it for many years.

Some Suggestions for the New Year

1. Keep your friends posted on your school location, position, and activities by sending personal and association news to INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

2. Give us the dates and tentative programs of your association meetings at least two months ahead of time for publication.

3. Send reports of your association meetings to us for publication.

4. Drop us a postal if you want an index for your 1947 volume of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

5. Make your March of Dimes (January 15–30) donation.

6. Buy Christmas seals to fight tuberculosis if you have not done so already.

7. Buy U. S. Savings Bonds.

Coming Conventions

Dec. 26–31. American Association for the Advancement of Science, at Chicago, Ill. Headquarters, Sherman Hotel. Secretary, Dr. F. R. Moulton, 1515 Massachusetts Ave., N.W., Washington 5, D. C.

Dec. 27–29. National Council of Geography Teachers, at Charlottesville, Va. Headquarters, University of Virginia. Secretary, Clyde F. Kohn, Northwestern University, Evanston, Ill.

Dec. 29–31. Ohio Education Association, at Columbus, Ohio. Headquarters, Deshler-Wallick Hotel. Secretary, Walton B. Bliss, 215 East Broad St., Columbus 15, Ohio.

Dec. 29–31. Pennsylvania State Education Association, at Harrisburg, Pa. Headquarters, Penn Harris Hotel. Secretary, H. E. Gayman, 400 North Third St., Harrisburg, Pa.

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Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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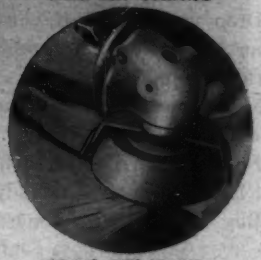
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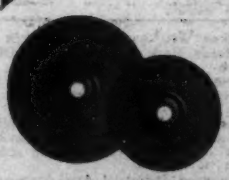
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Industrial Arts and the Core Curriculum

ROBERT W. CYNAR
Instructor of Graphic Arts
Patrick Henry Junior High School
New York City

Industrial Arts as Functional Education

Education is a preparation "which fits the whole man for his grand vocation as a member of society and a citizen of the world . . . plans must be laid for vigorous coeducation of mind and body as an inseparable unity in every stage of their development."[1]

A philosophy of education which includes the concept here expressed — and all educators have expressed their thoughts in similar words — implies that complete development of the individual is impossible without the cultivation of the three sides of his nature: physical, intellectual, and emotional. Traditional education satisfies the intellectual and emotional side of the individual but neglects the physical. On the other hand industrial arts considers the pupil as an entity, it involves all three sides of the pupils' nature, thus providing for growth in all three of these simultaneously.

The student in an industrial-arts program takes part in real-life situations. In his planning and construction he has an opportunity to create and express himself, and these are factors essential to a complete cycle of experiences. We are familiar with the other advantages of industrial arts over pure, dry, unrelated subject matter, but our concern is to show that industrial arts is functional education, that it cannot be overlooked in any progressive educational program.

"Industrial arts has as its aim the realization of accepted general education objectives, as these are interpreted in terms of reality and of modern-life situations. It makes of a relevant objective something more than a glowing generality forming a halo about a set of curriculum activities that contribute little toward definite and practical outcomes under the objectives."[2]

"The school must become a place where life, real experiencing, goes on. Only on this basis can our children learn what they need."[3] This statement presents briefly the thinking behind most of the efforts on curriculum re-building in the past twenty years.

"Schooling is not preparation for life; it is life. . . . Study of mental life has made evident the fundamental worth of native tendencies to explore, to manipulate tools and materials, to construct. . . . When exercises which are prompted by these instincts are a part of the regular school program, the whole pupil is engaged, the artificial gap between life in school and out is reduced. . . . Without something of this kind, it is not possible to secure the normal estate of effective learning; namely, that knowledge-getting be an outgrowth of activities having their own end, instead of a school task . . . Aside from the fact that active occupations represent things to do, not studies, their educational significance consists in the fact that they may typify social situations."[4]

Any list of objectives will enumerate the many facts, abilities, and attitudes that should be developed; these of course are idealistic goals. But industrial-arts teachers know that when pupils leave their shops they have a finer appreciation of good workmanship, and of good design. They are proud of their ability to make useful things, to be self-reliant and to be versed in orderly methods of procedure — and aren't these experiences identifiable with social values of adult life?

As industrial arts becomes increasingly recognized as general education, it increases emphasis upon related scientific knowledge and social habits rather than upon manual and mechanical skills as formerly . . . it specializes in practical experiences, and this is the purpose of all education.

"The conclusion is logical and inescapable. If educators are to do something more than *talk about* complete growth of the individual, exercise of fundamental native tendencies, making up for the admitted shortcomings of informal education, adjustment to adult-life situations, recognition of individual differences among pupils, and other fundamental planks in any modern educational platform; they are bound to recognize the indispensible contribution of the industrial arts."[5]

The Core Curriculum

Once again the pioneers are west of the Hudson river; this time they are the educational pioneers who are adopting and revising their curricula to meet the ever changing demands of society.

The economic barometer not only controls the destinies of business, but exerts pressure upon many social traditions. It was this economic upheaval of the 30's that brought about the scrutiny of secondary schools. Society began to ponder if our school was the legitimate child of society? Was it worthy of the generous support which has been extended it? What dividends was it paying upon the investment? Much to the chagrin of society these questions were answered in the negative. The task was self-evident; what are the factors hampering the expected function of the educational program. These may be summarized as follows:

1. The changing conception of the individual in relationship to society
2. The youth problem of unemployment and maladjustment
3. The loss of traditional faith in the disciplinary and cultural values of certain subjects known as mind trainers, which came as an outcome of educational research
4. The growth of the philosophy of education as experience

[1] Jacks, *Education of the Whole Man*, pp. 24, 27.
[2] *Trends in Industrial Arts*, pp. 2, 3.
[3] Kilpatrick, W. H., *Education for a Changing Civilization*, p. 85.
[4] Dewey, John, *Democracy and Education*, pp. 228, 229.
[5] Bawden, W. T., *Industrial Arts in Modern Education*, p. 26.

5. The democratizing of the high school by the influx of youth[6].

Teachers, schools, and communities went into the task of reorganization with gusto. Educationally speaking it was the thing to do; everyone climbed aboard the bandwagon; everyone was to be the saviour of the educational system. Out of this curriculum of confusion merged several constructive attempts at improvement; (1) the correlated curriculum, (2) the fused curriculum, (3) the core curriculum, and (4) the experience curriculum.

We will only consider the core curriculum which shows much promise and popularity and seems to be the major competitor of the subject curriculum in the secondary school.

The core curriculum presupposes certain specific types of learning experiences or needs as basic for all pupils going through school, but this need not mean a common fixed body of content for all. It might be said that the core idea endorses a broad area of experiences rather than the specific experiences within that area. To provide for individual interests a program of electives is attached to this concentration of effort. "Theoretically, the core is related functionally to the present and the future life activities of the pupil, being the point of departure in organizing such a course. However, it involves features from many fields formerly handled as separate subjects."[7] Although at first it seems like a combination of subjects it eventually grows into an identity of its own.

It is interesting to note that the time allotment is very flexible, and most of the schools operating under this program have devised their own time schedules. One example will suffice. That is the time schedule used in the core plan of the Tulsa, Okla., Central High School:[8]

The purpose of this sliding scale is that core topics in the lower grades are more essential to the development of the youth, whereas in the upper years more time is devoted to electives so that students may pursue their interests.

	7th	*8th*	*9th*	*10th*	*11th*	*12th*
Core Subject	6	5	4	3	2	1
Electives	0	1	2	3	4	5

Time schedule, core plan at Tulsa, Okla.

Although the term core is sometimes applied to a single subject field, the true core might be considered as involving a longer period of time than a 40- to 60-minute period and dependence for material upon one area which under a subject curriculum would comprise two or more subject fields.

"The core is concerned as psychologically affording a better means than did the separate subjects to the end — the integration of the individual both within himself and with his environment."[9]

"Core is an experience in democratic living and democratic learning. It is a method not a subject. . . . It is the heart of the matter so far as the curriculum is concerned."[10]

The core is the answer to the challenge of what can be done to teach the values of democracy, its processes, and establish habits and attitudes of citizenship.

[6]Spears, H., *The Emerging High-School Curriculum and Its Direction*, pp. 43–45.

[7]*Ibid.*, p. 61.

[8]Foster, E. C., *Administrative Practices in Large High Schools*, p. 406.

[9]*Ibid.*, p. 63.

[10]MacConnell, Melby, Arndt., *New Schools for a New Culture*, p. 22.

(To be continued)

Presenting a Course of Elementary Metallurgy to Apprentices

LESTER P. SPENCER
Kensington, Conn.

The proper training of apprentices not only in their chosen field but also in the related fields such as mathematics, metallurgy, chemistry, etc., is important in the training program established by industry to produce competent workmen that are an asset to the company that they represent. Thus, in many communities, programs have been successfully instituted to correlate related subject matter to actual training in the factory, and, in many cases, encouragement is given to apprentices to devote evenings on a program of self-improvement at the local educational center which may be the vocational or trade school, the high school, or college. This may be in the form of a planned program of study over a number of years leading to a certificate of accomplishment or it may be individual subjects which may benefit the student in a better understanding of the value of his trade.

These related subjects are important cogs in the well-rounded apprentice program and their function is not to produce expert mathematicians, metallurgists, or chemists, but only to aid in producing a better understanding of a trade in conjunction with manufacturing operations. Thus, as an example, the foundry apprentice, whether it be a molder, coremaker, or patternmaker should have a fairly sound training in metallurgy, mathematics, chemistry and, possibly, physics in relation to his particular field of endeavor. The metallurgical principles and chemistry of cupola operation should be thoroughly explained and discussed to those who are in the cast iron field; in like manner, to those apprentices in the steel casting field, the principles of either open hearth or electric furnace operation should be stressed; and for the apprentices in the malleable iron casting field, both the cupola and air furnace operation should be set up as a matter of discussion. To all of these students, the fundamental principles in the compounding of foundry and core sands should be taught along with the technique and purpose of sand testing and sand reclamation. Physical properties of materials associated with foundry work and heat-treating methods used in their particular industry also should be stressed.

As another example, the apprenticed tool- and diemaker or the machinist must have certain specific related information. Thus, in the field of metallurgy, he should be thoroughly versed in the principal methods of heat-treatment in conjunction with the effect of improper tool and die design. Also, an introductory knowledge of steelmaking processes should be given so that the student may have a knowledge of the relative value of the material with which he is working. He should also be introduced to cutting compounds or drawing compounds so that correlation may be made

between this factor and the life of a die or a tool.

Similar factors may be brought to light in other occupations where specific information relative to a given trade enables the student to realize not only the importance of the specific trade to industry, but also enables him to value his skill more highly and ultimately give him a feeling of "pride of accomplishment."

In the teaching of metallurgical subjects to apprentices, there are several factors that one must consider, namely:

1. *The Instructor:* This is the most important factor since the instructor must not only be well versed scholastically, but also should be a man of wide experiences so that he may be able to properly analyze the requirements of his particular trade.

2. *The Student:* It is very important that a thorough analysis be made of each student, and that an evaluation be arrived at as to the student's ability, temperament, and interest. A good instructor will realize and accept that students vary in their capacity for grasping subject matter, and prepare himself to give individual instruction if that be necessary.

3. *The Subject Matter:* The subject matter should be arranged in instructional units. In the case of a subject on "Metallurgy of Iron and Steels" the course would deal with the raw material, the various melting practices, and the working phases and applications of the various steel products. Wherever possible, plant visitations and visual aids in the form of slides or motion pictures should be utilized to illustrate the text material.

Course Outline for a Class in Metallurgy of Iron and Steel

Such a course in the metallurgy of iron and steel should incorporate the following units.

1. *Introduction:* A historical explanation of the value of metals to mankind and the subsequent rise of civilization and standards of living with the increased utility of the metallic resources in the world or in a particular country. Stress the historical background of the iron and steel industry and in so doing, pave the way to the succeeding units.

2. *Chemical Principles:* This unit would be for the benefit of those apprentices that had little or no chemistry. In this unit various chemical laws are stated and illustrated and emphasis is placed on the relationship of these chemical principles to the various phases of metallurgical practices used in the steel industry.

3. *Refractories:* This would involve a study of the various types of refractories, their uses and properties, not only at room temperature, but also under conditions of service. This unit would be particularly stressed to foundry apprentices because of their constant everyday work experience with refractories.

4. *Fuels:* This unit would provide informational discussion on the various types of fuels that are in use today, the method of mining and preparation, and the comparative value in accordance to energy obtainable, economics, and use.

5. *Ores:* This unit presents the importance of ores, the methods used in mining them, how our bodies are evaluated, and how the ore must be prepared before it can be used in the blast furnace.

6. *The Blast Furnace:* The blast furnace is discussed with emphasis on its construction, its operation, the chemical and metallurgical principles involved in its use, and the technique of pouring the molten metal produced by it. This unit would be enlarged to greater detail to the foundry apprentices especially in the cast iron field since the pig iron used in the foundry comes from this source.

7. *The Foundry:* This is another unit that would be of interest to the foundry apprentice and those that are interested in either the welding or machining of foundry castings. It should comprise a description of a cupola, the methods and terminology used in both the melting and casting phases, and the importance of sand to the foundryman. Properties and uses of the various types of irons obtainable can also be mentioned along with the various test procedures that are used in the foundry for the evaluation of not only the cast metal, but also the other materials used in foundry work.

8. *Malleable Iron:* Another phase of casting is discussed in this unit with emphasis on types of furnaces, technique used in melting, and the chemical and metallurgical principles involved in the various processes. The annealing cycle should also be stressed and the various types of malleable iron should be illustrated along with their properties and uses.

9. *Wrought Iron:* This material whose properties are so well known should be discussed in detail. Not only the obsolete practice of puddling should be discussed, but also the newer method of manufacture should be included. Thorough description on the processes involved should be included along with properties and uses of the material in industry.

10. *Crucible Steel:* Although this proc-

Hit It

This picture won first prize in Class 3 (Hobbies and Recreations), in the 1947 National High School Photographic Award contest. It was submitted by John Allen Astin of the Woodrow Wilson High School, Bethesda, Md.

ess is obsolete as far as industry is concerned, it is well to include a description of the process, and discuss its advantages and disadvantages for the purpose of historical insight of a process that meant so much in the early stages of this mighty industry.

11. *Bessemer Steel:* This unit should include description of the furnace, mode of operations, advantages and disadvantages of the method, modern advancements and uses. This particular unit should be stressed with the tool and die apprentices along with the machinist apprentices since all of the free cutting grades of steels are produced by this process. Both the chemistry and metallurgy of the operation in relation to the free machining grades should be stressed.

12. *Open Hearth Steel:* This is particularly interesting to the steel foundry apprentice, especially to those that cast directly from the acid open hearth. Here as with the Bessemer process, the furnace description, mode of operation, chemical and metallurgical principles involved, advantages and disadvantages, modern advances and uses should be discussed. In this process, two individual types of furnaces should be stressed, namely, the basic and the acid process and the particular use of each explained thoroughly.

13. *Electric Steel:* This, as is the case in the open hearth furnace, should be stressed to the steel foundry apprentice, especially to those that make use of this process in the factory. Both the acid and the basic type furnaces should be discussed in regard to the various items listed under the open hearth practice.

14. *Alloys:* This unit brings to light the various possible alloying additions that are made in the various steelmaking processes. The type of alloys that is used, the methods used in addition, and the particular end use of the alloying steel should be incorporated.

15. *Mechanical Working:* This unit is a rather lengthy unit and should be broken into component parts, thus, one phase would deal with ingots and the technique used in pouring, along with a discussion on the defects of ingots, such as segregation, pipe, etc.; preventive measures of controlling these defects; and methods used in deoxidation to provide the various grades of ingot material. Another phase that should be covered is the method of breakdown of ingot to bar and the various uses of these bars in the manufacturing industries, such as the fabrication of structural shapes and rails, the manufacture of wire, pipe manufacture, and forgings.

16. *The Testing of Steel:* This unit would also be rather lengthy being devoted to the various phases of testing which is commonly used in the steel and fabricating industry. It should include detailed description of such tests as the hardness test, the tensile test, the X-ray test, the fatigue test, the impact test, etc.

Because of the difficulty of presentation of this related subject matter, since the bulk of it is more or less factual information, it is recommended that the instructor employ as many visual aids as possible. Suggestions along this line would comprise:

1. Photographs of mill operations. Most of the mills are glad to donate these.

2. Motion pictures which can be obtained through the National Bureau of Mines and include many worth-while films. Another source is the various companies, whose advertising departments often have films available for educational purposes.

3: Plant visitation, which in the opinion of the author is the best mode of visual education. Many plants within the community or surrounding territory would be glad to have a visitation where not only the processes can be viewed, but where direct information can be obtained from the guide as to the technique of the operation as applied to their particular field.

In many instances, the educational schools which serve the apprenticeship program have as a follow-up course, a program of "Heat Treatment of Steels" in which they not only provide factual information on the various processes, but also direct laboratory work based on the equipment that is available. Thus, they may have several furnaces which may be used to do all modes of heat-treatment including carburization, cyaniding, hardening and tempering of all types of plain carbon and alloy steels; hardness testing machines which can be utilized in observing increases in hardness, tensile testing machines, or even metallographic equipment which indicates the structural differences between untreated and treated steel, or, structural differences between such materials as wrought iron, sulfurized steel for free machining, and open hearth steel. The structural differences of steels as the carbon content increases from a 20 per cent carbon steel to a 90 per cent carbon steel, also may be studied in this manner.

Where heat-treating equipment is not available, many institutions correlate the subject matter taught in metallurgy with courses in welding where various grades of steels are welded, or, in the machine shop where various grades of steels are machined. In the case of the machine shop, difficulty of machining, tool life, relationship between rakes, angles, etc., of cutting tools may be advantageously correlated with speed and feed in the study of various types of material. In the case of the welding shop, the difficulty of welding, relationship of rod used, effect of pre-treatments and subsequent treatments after welding, strength of welds, etc., all may be judged in relationship to the various grades of steels that are taught in the metallurgy course.

Both mentioned programs can be used advantageously; however, it is readily seen that the first requirement of a good course in metallurgy is an adequate instructor, who has both education and experience to fit a standard course to the requirements of the student.

SAFE WINTER DRIVING TIPS

Following are rules, based on National Safety Council research, for driving under adverse weather and road conditions:

Winter Rules

1. Adjust speed to conditions.
2. Slow down well in advance of intersections and curves.
3. Follow other vehicles at safe distances.
4. Put on tire chains when roads are slippery with snow or ice. They provide "go" traction and reduce braking distances 50 per cent.
5. Make sure windshield wipers-defrosters really work. Signal intentions of turning or stopping.
6. Apply brakes lightly and intermittently on icy roads.
7. Remember that braking distances on snow and ice without antiskid chains are from 4 to 11 times greater than on dry pavement, and that wet ice at near thawing temperatures is twice as slippery as dry ice near zero.

Ralph A. Moyer, research associate professor of highway engineering at Iowa State College, says to the winter driver:

"If you can't start, it's a misfortune; if you can't stop, it's a calamity! You must see a hazard to avoid it. Reduce your speed and be prepared with practical precautions."

Skidding and reduced visibility are named as major hazards. One state reported 69 per cent of all December auto accidents occurred on snow or ice covered highways.

When a noted American police official recently went to Tokyo to advise the police there, he was treated to a particularly hair-raising ride through the city's streets by a Japanese civilian hired to drive an army jeep. After one incident in which three pedestrians narrowly escaped with their lives, the American official inquired about the driver's training.

"I was a Kamikaze pilot," was the polite reply! — *National Conservation Bureau.*

Some Leaders in Industrial Education

Bonser—(Continued)

WILLIAM T. BAWDEN
Director of Publications
Kansas State Teachers College
Pittsburg, Kans.

(Continued from page 413 of the December, 1947, issue)

Origin in an Earlier Period

It may not be necessary to fix the exact time and place when the precise wording of the now famous definition was first enunciated. We know that it was used repeatedly in public addresses, in magazine articles, in the college lecture room, and in correspondence, for some time before the publication of the book, mentioned in the foregoing, in 1923.

It is significant, I think, to note that the germ of the idea, if not the precise wording that later appeared as a definition, is found in two papers, one contributed by Dean Russell, in 1909, and the other by Dr. Bonser, in 1910, which were republished in 1914 by Teachers College under the title, *Industrial Education.*[4] Since this historic pamphlet is out of print, and no longer available to students except in a few libraries, it is worth while to cite chapter and verse.

The first use of the terms we are seeking occurs on page 6 of the pamphlet, where Dean Russell advocates "the study of industries for the sake of a better perspective on man's achievements in controlling the production, distribution, and consumption" of material things; and on page 10, where he refers to "the industrial processes by which man acquires his material possessions and shapes them according to his desires," and concludes that, "for pedagogical purposes, the materials of most significance in the industries are: (1) foods, (2) textiles, (3) woods, (4) metals, and (5) clays and other allied earth materials."

Dean Russell predicts, on page 17, that "manual training, fine arts, domestic art, and domestic science will drop out below the seventh grade, and in their place we shall have the one subject of industrial arts, the elements of industries. . . . In the lower school, manual exercises will be used as a means of self-expression, a method of teaching, rather than a subject of instruction or a way of acquiring technical skill."

The following passages suggest the development of Dr. Bonser's line of thought. "The social and liberal elements in the study of the industrial arts are more significant than are the elements involved in the mere manipulation of materials," page 28. In arranging courses of instruction, "definite units typical of important industries must be selected" (p. 30). The objectives in view "will be just as easily accomplished if the dominant motive is the thought side of the piece of work as a type study in some large industry as if the chief end point were skillful manipulation" (p. 30). "The use of the industries is basic as a material out of which and upon which to build that culture of hand and brain and soul which makes the individual alert, inventive, intelligent, appreciative, and moral in any vocational activity which either choice or circumstance may impose" (p. 36). "There would be much concentrated attention upon the processes and practices in the dominant industries studied. . . . Appreciation of technical excellence cannot be fully developed without active participation in production" (p. 39).

The closest approach to the language of the definition is found near the conclusion of this paper: "Industrial arts as a school subject is the distilled experience of man in his resolution of natural materials to his needs, for creature comfort, to the end that he may more richly live his spiritual life" (p. 50).

A New Concept of Industrial Arts

Lest I be misunderstood, let me hasten to add that I do not intend to exaggerate the importance of Dr. Bonser's definition of industrial arts. It was not a potent influence merely as a definition, but because it was a symbol of a new approach to a school subject that was receiving a great deal of attention and popular support. It registered because it was a formula for a new concept of industrial arts.

It is difficult to give an adequate statement of Dr. Bonser's concept of industrial arts in a few words. He, himself, did not do so. In fact, he devoted several public addresses and many printed pages to the effort to convey his ideas to others. The following summary and condensation will serve the purpose of this sketch,[5] and the reader who wishes a more complete treatment may go to the original sources.[6]

By taking proper units of work from each of these five fields (food products, textiles, wood products, iron and other metals, clay and allied earth products), a subject of study can be developed which will have a body of thought that will command respect. In developing a knowledge and intelligent understanding of social and economic relationships essential to every child, and an appreciation for and sympathy with the work of industrial vocations, it will be as valuable as any other subject in the elementary school.

In developing such a course, definite units typical of important industries must be selected. These will have to be graded in such sequence that simple phases are developed in the lower grades, and more complex phases as the pupil proceeds into higher grades. The units will have to be offered in such order that there will be provided the proper opportunities and motives for the development of power and some degree of efficiency in the manipulation of materials. The projects in wood, for example, will have to be so selected as to be within the range of possible construction for the respective grades, and will have to be in such sequence as to develop a growing knowledge of the use of tools, and a growing complexity in the principles and processes of construction.

The making of a cabinet in wood, of a garment in textiles, of a cold chisel in iron, of bread, or cheese, or starch among foods, are all so rich in thought material that every one of them may be taught without any of that formal grind that so often robs all manual schoolwork of any real developmental value.

The great point of emphasis is not skill in manipulation, but rather helping the mind to grasp the meaning of these industrial activities. It is to clarify ideas and appreciative meanings, feelings, difficulties, and excellencies, and not to make mechanics or cooks, or dressmakers, or special workers in any other field.

Consider the following units of industrial work chosen from the

[4]James E. Russell, *The School and Industrial Life, Educational Review*, New York, Dec., 1909.
Frederick G. Bonser, *Fundamental Values in Industrial Education*, Technical Education Bulletin, No. 10, Teachers College, 1910.
Russell and Bonser, *Industrial Education*. The two articles listed above, reprinted in pamphlet form, Bureau of Publications, Teachers College, Columbia University, New York, 1914, 50 pp.

[5]Russell and Bonser, *Industrial Education*, pp. 29–34.
[6]See list of references on p. 16.

field of foods to illustrate the possibilities. The divisions of foods suggested are cereals, fruits, vegetables, milk products, meats, eggs, and fish.

Under cereals we have the commercial processes of milling, starch making, sugar and oil manufacture, canning, and cooking. Several of the most fundamental processes involved are possible of demonstration by the children in the schools. The grinding of corn and wheat may be accomplished in the various ways in which this has developed historically. A mill may be visited where the work is done in a small but modern way. The various products from milling may be shown by samples, and their constituents, values, and methods of production studied. Finally, through books, the large descriptive phases of the milling industry may be taken up.

For fruits and vegetables, studies are possible in canning, evaporating, preserving, pickling, sugar making, and cooking.

Under milk products are the industries of butter and cheese making and condensed milk manufacture.

In the study of meats, eggs, and fish, simple processes of drying, canning, preserving, pickling, and cooking may be taken up, and the simpler by-products, such as soap making and fertilizers, can be studied.

In none of these is it assumed that children in the grades would develop much skill — no more than it is to be assumed that the study of poetry, pictures, or music will make poets, artists, or musicians of them.

In textiles, the four great staples (wool, cotton, linen, and silk) may be studied in all the fundamental processes of manufacture. For wool, it is possible in the lower grades to begin with a sheep pelt and have the children themselves accomplish the washing, combing, carding, spinning, dyeing, weaving, fulling, shearing, shrinking, and pressing of the wool. Later studies may be given to the commercial methods of manufacture, to the differences between worsteds and other wools, to the content of felt, shoddy, cashmere, mohair, alpaca, and camel's hair.

In the study of cotton, ginning, cleaning, carding, and other processes may be reproduced by the children. Mercerization and other commercial processes may come in the upper grades. Descriptive studies of the great milling centers and processses, of wages, of the social conditions, of labor, of the extent and meaning of these industries, of allied industries, such as custom clothing manufacture, sweat shops, and others, may be taken up in their proper relationships in the upper grades.

Flax may be grown in the school garden, and rippled, retted, broken, scutched, heckled, spun, dyed, woven, and bleached. In this connection, allied textile materials may be studied, including jute, hemp, manila, sisal, China grass, and other important tropical fibers.

Silk may be grown, spun, woven, and dyed, in connection with the raising and study of silkworms.

In the field of woods, we may study milling, rough and finished carpentry, cabinetmaking, box making, and cooperage. This is not to make carpenters, or coopers, or cabinetmakers, but to learn the kinds and qualities of woods used and the reasons; the processes of handling and the reasons; the tools used and the reasons; the stains, varnishes, and paints used and the reasons; the appropriateness of selection of wood and design to the purpose; and the relation of woodworking industries to other industries and to our whole social life — these are the aims.

In metalwork we can demonstrate simple processes of smelting, forging, molding and casting, steelmaking, and welding in iron. We can show plating, pressing, riveting, and soldering in tin; rolling and casting in zinc and lead; plating, engraving, and hammering in copper, illustrative of the same processes in nickel, silver, and gold.

For clay and allied earth products, we have possible studies in the processes of pottery making, the making of brick and tile, stone cutting, lime and cement construction, and perhaps porcelain and glass.

Besides these five larger fields, foods, textiles, woods, metal, clay, there are a number of miscellaneous industries — basketry, papermaking, printing, illustrating, bookbinding, upholstery, leatherwork, making of toys and games, making electrical apparatus, and others of large importance which may be utilized.

The work in all phases of industrial construction would furnish material for cultivation of appreciation. Masterpieces would be necessary in all lines as a part of the plan of study — well-made and artistic pieces of woodwork, metalwork, textiles, china and other pottery, as well as the products of fine art in pictures, statuary, and architecture.

Dr. Bonser concludes his analysis by pointing out that this type of work will not overemphasize the utilitarian. "We are prone to forget how really little of genuine culture the majority of pupils get from the elementary school as it is. Something must be done to make the school seem, and in fact be, more really worth while. Such treatment of the industries as is proposed would vitalize every subject of the curriculum.

"By the introduction of these forms of study the *method* of our work is markedly improved. Processes and principles are approached with a real motive. Situations are presented as problems to be solved. Their solution often involves constructions in laboratories and shops, excursions, investigations, and questions asked of people and books."

Varied Reception

After the manner of the parable of "The Sower," it was inevitable that Dr. Bonser's proposals should meet a varied reception. "Some seed fell on good ground, some on stony ground," and some of his suggestions were taken up by those who were only indifferently able to comprehend and utilize them.

There was a considerable body of industrial-arts teachers who took a sympathetic attitude toward the new proposals, and were ready to respond to his leadership. From 1899 to 1931, Arthur W. Richards was developing a program of industrial arts at the Ethical Culture Schools, in New York City, that had something in common with the Bonser concept, although the Richards program was considerably narrower in scope.[7]

Richards advocated the applications of physical science and mechanics to the manipulative experiences in the school shop, through the making of working models of bridges, cranes, mechanical shovels, water wheels, windmills, and other mechanical devices. He was one of the earliest teachers to emphasize the importance of educative content in school shopwork. He was also one of the first shop teachers to encourage pupils to work independently, on individual projects, in accordance with work plans formulated by the pupils themselves.

The Problem of Organization

Some shop teachers experienced difficulty in making the Bonser program effective because of the problem of organization. It is not difficult to visualize the school shop or classroom, in which some of the activities are carried on which were briefly summarized in preceding paragraphs, as a place characterized by a certain amount of confusion and disorder. It requires a higher degree of organizing and administrative ability to plan the equipment, projects, materials, processes, and learning procedures on the Bonser plan than is called for by the traditional program of woodwork and drafting. Undoubtedly some teachers essayed the

[7] Arthur W. Richards, The Thought Side of Manual Training, *Manual Training Magazine*, Vol. 3, No. 2, Jan., 1902, pp. 61–79.

experiment with the new program without the requisite preparation, and lacking the necessary skill in organization and management to make it effective.

Another aberration from the Bonser plan was exhibited by certain self-styled "progressive" teachers who, lacking the technical skills of the genuine shop teacher, allowed their industrial-arts courses to degenerate into *studies about* industry, to the neglect of actual experiences in the processes, operations, and constructions of industry.

Recognition of Values

Before bringing this sketch to a close, I should like to point out that Dr. Bonser was something more than a *specialist* in his thought and practice concerning industrial arts. He recognized the true relationship which industrial arts sustains not only to general education, of which he regarded it as an essential and integral part, but also to vocational education, of which he regarded it as an essential and logical preliminary. One brief passage in which he indicates clearly a method of distinction may be cited:[8]

"The general school system should provide as a part of its legitimate work those phases of the industrial arts which are primarily educational. Whenever specialized training, the chief end point of which is a high degree of skill and technical efficiency, becomes the primary aim, the work of the segregated trade or vocational school or course should begin. This attitude for both the elementary and secondary schools in the general system would limit work in manipulation of materials and processes of construction actually participated in to those the purpose of which is the development of clear ideas and appreciative insights."

It is worthy to note, further, that both Dean Russell and Dr. Bonser agree on and state clearly the function and values of vocational education. Thus, on page 5, Dean Russell writes:

"With six years of good fundamental training, the child is ready at 13 or 14 to look forward to his lifework. For those who go to college, it is time to begin specialization along academic lines; for those who are to become artisans or farmers or tradesmen, as soon as possible, it is time to begin vocational training. Specialization at the age of 12 to 14 years should begin gradually, and in the vocational lines it should be essentially preparatory to the later years of trade school or apprentice training. When the boy or girl hears the call of vocational life, specialization should begin, and gradually narrow into technical training for specific occupations — for some at the age of 25 in professions; for others at the age of 16 in the trades. Between these extremes will be found most vocations in which men and women engage."

And again, on page 19, "My conclusion is that industrial education is essential to the social and political well-being of a democracy."

On page 38, Dr. Bonser writes:

"For the secondary school (we recognize) the need for differentiation of courses for various types of students. The solution proposed is for a common, democratic secondary school with courses of study adapted to the needs of those five groups of life callings, the professional, commercial, agricultural, industrial, and household."

After referring, on page 40, to the fact that there are nearly one million young men and women enrolled in various types of technical institutes, continuation schools, correspondence schools, and other supplementary schools for those who have left the regular day school to enter upon employment, Dr. Bonser writes:

"Let us have such schools so long as a need for them exists. But these one million young people are just one million reasons why the public elementary and secondary schools should awake to their responsibility and so establish the work of their daily offerings that no one may be driven out of them to secure a worthy education. This hue and cry for separate and numerous schools for industrial training is a most scathing indictment of the practical efficiency and the boasted democracy of our whole school system."

The attitude toward vocational education taken by these two authors of a constructive attempt to establish a sound educational basis for industrial arts is in striking contrast to the attitude toward industrial arts assumed by contemporary leaders of the newly evolving program of vocational education. The latter were outspoken in their unmitigated disparagement of everything advocated by those who were endeavoring to promote industrial arts in general education. Using the then current term, manual training, as a substantial synonym for educational opprobrium, the apostles of the new "honest-to-God" vocational education ridiculed and derided manual training, in all its forms and all its works.

It is true that much of the manual training of that day was indefensible, but it was not all bad. Some of the critics, not being widely traveled nor well informed, assumed that all of it was like the few samples they knew about. In their ignorance, they sought to radicate manual training from the schools, naïvely supposing that this consummation was indispensable to and would assure their own success.

Incidentally, this mistaken attitude, and the policies actuated by it, have left a heritage of bitterness from which the vocational education movement suffers to this day. How mistaken and unwise the attitude was is emphasized by the phenomenal growth and improvement of the industrial-arts movement. But that is another story.

(To be continued)

[8] *Industrial Education, op. cit.*, p. 20.

English For Trade and Vocational Schools

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Adjectives and Adverbs

In the vocational or trade school course in English, little stress should be placed on the most highly academic phases of using adjectives and adverbs correctly. As some mental maturity is necessary for an understanding of modifiers, the work may be divided into two separate units, one for the junior, and one for the senior year.

The spelling unit for the junior year consists of the following adjectives: *its, their, whose, your, two.* Most high school students have trouble with one or several of these, confusing them with the contractions *it's, they're, you're, who's,* the adverbs *too* and *there,* and the preposition (and sign of the infinitive) *to.*

As my school uses an individual work-card system, I can easily keep a record of the mistakes made by each student in using these words. A workable record can be kept in a roll book, or an instructor can keep a record on a sheet of paper conveniently located. Each student works

only on the words that cause errors in his work. When a student writes "It's brakes need adjusting," he does so because he thinks that the *'s* shows ownership. Here, of course the apostrophe marks the omission of the letter *i*. As soon as the mistake occurs, I have the student study or copy the following wall chart:

IT'S = IT IS

The apostrophe (') takes the place of the letter *i*.

This word (*it's*) does *not* show ownership.

Example: *It's* a chisel. (Notice that no ownership is shown here by *it's*.)
It is a chisel.

Whenever you use *it's*, be sure that it means *it is*.

ITS (ownership)

Its (without the apostrophe) shows ownership (possession).

Its does not follow the usual rule for showing ownership. Some other words which show ownership without using *'s* are *his, whose, our, their, your, my, her, yours, ours.*

Its is usually followed by a noun (name of a person, place, or thing).

Example: its head, its eyes, its place, its top
(noun) (noun) (noun) (noun)

Its means "belonging to it."

Its is an adjective because it modifies a noun.

When a student seems to understand that *its* shows ownership, I have him write five sentences for practice; for example, like these:

1. The car stalled because its fuel pump had dirt in it.
2. The old car crashed into the building and ripped off one of its fenders.
3. The plane was wrecked because its wheels would not come down.
4. Its lighting system was defective.
5. In the storm our ship lost three of its lifeboats.

This method of studying and writing practice sentences is repeated until the instructor is sure that the student knows the difference between *its* and *it's* and (in my school) until he has stopped making mistakes in using these words in written work.

Exactly the same method is used for *who's* and *whose*. A similar chart, showing that *who's* is a contraction for *who is* and that *whose* is an adjective which shows ownership, can easily be prepared for use in class.

Mistakes in *your* and *you're* occur very rarely, and can be treated like *its — it's* and *whose — who's*. Occasionally *they're* (*they are*) is confused with *their* and *there*, but not often. Confusion of *their* and *there*, however, occurs frequently and requires special attention. The same general method is used, utilizing the following wall chart:

THEIR

Their means *belonging to them.*

Their is usually followed by a noun.

Notice that *their* has *ei* between the *h* and *r*. (th *ei* r)

Examples: their tools, their car.
(noun) (noun)
their bicycles, their names
(noun) (noun)

Their is an adjective because it modifies a noun.

THERE

There is a *place* word; it means *in that place, on that place, at that place,* or *to that place.*

Examples: Put it *there*. It is in *there*. Jack was *there*, too.

There is an adverb of place. It answers the question "Where?"

There is also used to start sentences, usually with *is, are, was, were.*

Examples: *There is* a mistake in your work. *There are* three chisels in that box. *There was* a terrible wreck. *There were* four boys in the car.

Errors in using *to, too, two* are numerous in the lower classes. By the end of the senior year these mistakes have disappeared because juniors cannot complete their work until they have learned how to use these difficult words. They learn these words one at a time, studying each as it is used incorrectly in written work.

Almost every boy knows the meaning of the word *two* (2). Errors in using *two* are almost always due to carelessness and can be quickly stopped. *To* and *too* cause many errors because students have no idea what the words mean. If a student writes "I went *too the game* last night" or "I was *to tired* to do any more studying," he is told to study or copy the following wall chart:

TOO

The word *too* is an adverb.

Too is usually followed by an adjective or an adverb.

Examples of *too* followed by an adjective:
Too easy, too small, too young, too high

Examples of *too* followed by an adverb:
Too easily, too rapidly, too quickly, too carelessly

Too sometimes means *also* or *in addition.*

Examples: You may go *too*. He broke his leg and his arm *too*.

After a student thinks that he knows how to use *too*, he uses the word in five sentences — like these:

1. He is too far away.
2. He ate too much candy.
3. He was driving too fast.
4. Your lights are too bright.
5. She talks too rapidly.

Later, if he again confuses *to* and *too*, he reviews the information on the chart, then writes 25 sentences, using correctly the word which gave him trouble. If this seems too severe for a second time, he can be told to write the expression he missed (in its correct form, of course) 25 times, with the understanding that if he misses it a third time, the 25-sentence job will follow. This method may not please an ultraprogressive educator, but it works well with vocational school students.

For *to* and *two* I do not use charts. Each student learns, in a unit on prepositions, to identify *to* as a preposition and to use it properly; and *two* requires no special work.

Wall charts can easily be prepared, either by the instructor or by students; they are gradually memorized by the students and produce a marked improvement in the work of the students.

To sum up briefly, these are the steps I use to help boys learn to use correctly the adjectives and adverbs discussed in the foregoing paragraphs:

1. Prepare a chart which can be hung in a convenient spot or written on the blackboard for students to copy and keep in their notebooks.
2. Have five sentences written to prove the student's knowledge.
3. For the second and third errors in the use of a word previously missed and studied, have the student write the expression missed several times (5–25 times) and use it in a number of sentences (5–25 sentences).
4. For additional errors, variations of the practice work listed in the foregoing are employed.

(*To be continued*)

AIRPLANE ACCIDENTS

Twelve fatal accidents occurred in the domestic operations of scheduled air transports during 1946. The death total was 107, including 75 passengers and 32 crew members.

The passenger death rate per 100,000,000 passenger-miles, in 1946, based on preliminary information, was 1.2 — a decrease of 43 per cent from the 1945 rate of 2.1 and equaling the previous low mark in 1939. The number of passengers killed in 1945 was 76 — one more than in 1946. — *National Safety Council.*

The General Library and the School Shop

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A departmental library, housed in the school shop, will serve quite satisfactorily in high schools where the industrial-arts courses meet two periods or approximately ninety minutes daily. This is true because little, if any, outside work is required. The library materials are used exclusively in the shop.

In high schools where industrial-arts courses meet only one period of approximately sixty minutes, probably little time should be devoted to the use of library materials during class time. Since it seems advisable that some additional work should be done by students in industrial-arts courses which operate on the single period schedule, it seems desirable to have the industrial-arts library materials in the general library.

The type of assignment which directs the students to use the industrial-arts materials intelligently is important. The writer has attained a rather satisfying degree of success from the two types here reported. One type is concerned with the preparation of plans by the student for his shop jobs, and the other directs the student to acquire information with respect to certain industrial-arts topics.

Planning the Shop Job

The assignment for planning the shop job is given to the students as follows:

You are to prepare plans for each shop job outside of class. A time schedule should be followed so your shopwork will not be retarded because you do not have plans ready for your next job. Your plans are to consist of two parts and are to be submitted for evaluation purposes before starting the shopwork. These two parts are:

1. *Detailed Drawings:* Detailed drawings of the object you are to make should be made on ¼-in. squared paper. (A foot ruler and an inexpensive compass are the only instruments needed. The use of the ¼-in. squared paper eliminates the need for carrying a drawing board and T square to the library.) This drawing should include: (*a*) small assembly drawing, if the object consists of two or more parts, showing how they fit together; (*b*) actual size dimensioned views (large objects may need to be drawn to scale); (*c*) bill of material showing number of pieces, size of pieces, and kind of material needed for the job.

2. *Operation List:* A list of operations for doing the job is to be written out in the order that they are to be performed. (This step will require careful thinking and planning.) If there is space enough at one side of the drawing, these operations may be written on it; otherwise they are to be written on a separate sheet of paper and attached to the drawing. Do not write them on the back of the drawing.

The teacher should check these plans carefully and question the student about the clarity of certain points. Since this work aids in attaining worth-while objectives it should be evaluated and a record made of the evaluation. This should aid the student to understand the importance of careful planning.

Written Reports

The purpose of the written report is to assist the student to acquire certain related information in the industrial-arts field. The student should plan to do the final writing of his report after he has had a few hours of experience with the topic in the shop. That is, a report on the topic of casting, should not be written until after the student has molded and cast two or three articles.

The assignment for written reports may be made as follows:

You are to prepare a *conceptual paper* (written report) on certain topics which are closely related to the shopwork in this course. For example, a paper of this type on the topic of *hammers* should include freehand sketches, tracings, or cutout pictures, and such written material that is required to convey clearly to the reader of your paper information of *industrial significance* with respect to hammers. Such information as types, sizes, material of construction, common brands, cost, correct use and care, how to select and install hammer handles, and such other useful information should be included.

The first step in the preparation of this type of paper should begin with extensive reading on the topic in the library as well as in your textbook. (This should be done regardless of how much you think you know about the topic to start with.) Visits to hardware stores and time spent browsing through the hardware section of catalogs will also prove helpful.

Cutting steel on a metal saw at the Hobart Trade School, Troy, Ohio
— Courtesy, Hobart Brothers Co., Troy, Ohio

The second step is to prepare an outline of the material you wish to present. Topic headings, such as the ones indicated above (types, sizes, etc.), are desirable for outline purposes. (A topic other than hammers would likely need some change in the outline topics.)

After reading and outlining, the third and final step is the actual preparation of the report. The purpose of this work is to provide concept building experiences for you — you are to become better informed with respect to industrial tools, machines, processes, methods, practices, and materials through these activities.

The assignment should be specific with respect to topic, main subjects under the topic and references. This is not to replace the demonstration by the teacher, but should be used to supplement it. This type of work should be broadening and integrating. That is, the student should learn certain facts that the teacher cannot take time to tell him, and the writing of the report should cause the student to pull facts together from reading, teacher discussion and demonstration, and his own shop activity to form a meaningful mass of knowledge with respect to certain industrial-arts topics.

Problems in Supervision and How to Meet Them

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(*Continued from page 408 of the December, 1947, issue*)

Adjusting Courses of Instruction to Rapidly Changing Training Needs

How do you keep courses of study adjusted to rapidly changing training needs?

"Keep constant contact with key industrial people (labor and management) concerned."

"Get suggestions from apprentice school instructors who are engineers and tradesmen, regarding new developments and necessary changes."

"Have frequent consultations with craft committees."

"Maintain informal contacts with trainees."

Changes in Shop Jobs to Suit Available Materials

What changes have you made in shop jobs (e.g., size, shape, or material) to suit available materials?

"Size of some jobs reduced by using more cold rolled material in machine shop. Tool steel jobs almost entirely eliminated."

"Case hardened cold rolled steel is used where possible. Classes changed over to the state production program."

"Four-inch stationary and swivel machinist vises useful projects. Junk yard steel used with gratifying results."

"Shifted from projects for student and school use to production jobs for war use."

"Criteria for all jobs include: (*a*) proper finish; (*b*) accuracy to proper tolerances; (*c*) the factor of time; (*d*) use of proper processes in correct sequence."

"Materials now used include cast iron, special tool steels, brass, copper, and magnesium."

Emphasis on Care and Repair of Tools and Equipment

Is it desirable practice to place emphasis on care and repair of tools and equipment as training jobs?

"Teaching proper care and use of machines and hand tools prevents waste due to unnecessary damage and breakage."

"Always have done as much of our own repair work as possible."

"Each student has some experience in care and repair of tools."

"Students work on installation of guards for machines."

Attracting and Selecting Qualified Trainees

What methods do you use to attract and select qualified trainees?

"Trainees are obtained through: (*a*) posters and hand bills; (*b*) satisfied trainees who bring friends; (*c*) personnel department of industrial concern who wishes to employ trainees; (*d*) paying while learning — may be a bad precedent; (*e*) newspaper articles and advertising; (*f*) radio announcements and programs; (*g*) recruiting letters; (*h*) talks before service clubs and other groups; (*i*) school principals and guidance counselors."

"In selecting trainees the procedures used are: (*a*) standardized battery of tests — manipulative, mechanical aptitude, and intelligence; (*b*) application blanks; (*c*) interviews. See Psychological and Educational Tests."

"It seems to be left to the directors of each program whether a trainee is accepted for training. They have to decide whether a trainee is employable. I think the supervisors should contact the industries and shipyards to find out definitely if persons with various deficiencies, and of certain ages, will be accepted after completing their courses."

Entrance Requirements for Classes

What entrance requirements have been established for admitting trainees to your shop classes? Give typical examples:

"In the beginning of the war production program a thorough physical examination was required. Many formerly rejected are now referred by industry for training."

"Ability to read and write English is the present educational standard. Only the more serious physical defects such as heart disease, tuberculosis, and venereal diseases debar applicants."

"In riveting classes for women: age 20 to 45 years, weight below 160 pounds."

Psychological and Educational Tests

Are psychological or educational tests used in selecting trainees?

"Since most trainees are now referred by industry no tests are used."

"During early part of the war when large waiting lists were available, tests were needed and used."

"See the Trainee Acceptance Center, Board of Education, Philadelphia. It is a federally aided testing and counseling clinic. It has done and is doing an excellent job of selection and counseling."

Solving Problems of Student Adjustment

What methods do you use for solving problems of student adjustment — emotional conflicts, failure to succeed in the training course?

"Use of the conference wisely conducted."

"Transfer of student from class. The

failure to adjust may be due to teacher."

"Lack of desire on part of learner has to be overcome."

Transferring to Other Classes

What help in transferring to other training classes is given to trainees who cannot do successful work in the course to which they have been assigned?

"Inform personnel officer of plant concerned."

"Mutual agreement of plant and school to satisfy trainee and future employer."

Giving Help in Finding Employment

What help in finding employment is given trainees?

"The co-operation with the United States Employment Service has been fine. Employment obtained by them is reported back to them."

"Problem now is to find trainees; formerly contacts with personnel departments of local industries were effective."

Follow-up After Employment

After employment, what follow-up procedure is used in your training program to determine whether trainees have adjusted to work properly?

"No set procedure but we inquire of employer concerning the trainees."

"Dissatisfaction is investigated and attempt made to make adjustment."

"Inquiry also made of trainees when met in plants or elsewhere."

Teaching All He Knows in a Week

How do you prevent the new teacher (especially the part-time teacher) from "teaching all he knows in a week"?

"Especially with new teachers and part-time teachers, use specific course outlines designed to show subject matter, references, practical application, demonstration, shop jobs, and time in clock hours, to be devoted to teaching of each unit."

"Insist that course outlines be followed strictly."

"First discuss some of the elementary techniques of teaching before he starts the job, stressing material he is planning to teach."

"Ask each new instructor to outline his lesson plans on paper even though material is available in mimeographed or printed form."

Providing Visual Education Aids

How do you provide adequately for visual education aids?

"Teachers are instructed in the use of visual aids."

"Special visual aids have been developed for use in war industries training classes."

"School has own Jam-Handy projector."

"Companies for whom training is given, lend films made in their plants."

"Funds in our school are not made available to take full advantage of such aids."

"We have a visual aid room set aside for exclusive use of the industrial department. Schedule for use of this room is prepared for full semester. Encourage use of models, exhibits, bulletin boards, and blackboards. Jam-Handy film strips are very good. We use practically all they have which bear on shopwork."

Introducing Live Instructional Material

How do you get part-time teachers to introduce live instructional material in evening trade extension and supplementary classes so that trainees will remain interested?

"Teachers work closely with industries — use blueprints and processes of industry."

"By selecting teachers for trade extension work who do not have an 'in-school' type of mind."

"By selecting jobs that student can use."

"By tying up his school job with his day job."

"Being emphatic in stressing importance of maintaining interest of adult trainees from the start of the course."

"Projects brought in by class members frequently provide instructional vehicles."

"Provide course outlines containing live instructional material."

"Discourage lecturing by teachers and encourage class discussions and development of lesson through questions and answers."

Getting Instructors to Stress Instruction as Well as Production

How do you convert attitudes of instructors from stress on production to a stress on instruction?

"Discuss with instructor objectives of courses to be taught."

"Provide instructional outline with production jobs in acceptable instructional order. Show why some nonproduction items may be necessary."

"Like to use production-minded instructor if he will also teach. Use production lines and factory methods as basis for instruction. Have difficulty with practical men who become absorbed in jobs to exclusion of teaching. With these we have to keep working and about one out of three we drop for this reason."

"Insist on use of visual aids and demonstrations. Set aside special time for visual aids. Have a policy for production work. Insist on use of student progress chart based on an instructional unit chart or trade analysis."

Controlling Production Work So As to Maintain Good Instructional Order

How do you aid your teachers in controlling production work in the school shop so as not to interfere with the proper instructional order?

"Plan production work so that it is an integral part of course."

"Maintain production control department, large or small according to size of student body. If production work is properly planned by one who understands both production and teaching, latter is vastly improved through production. Especially true of short courses for war production trainees."

"Maintain production lines which are counterparts of lines in industry."

Handling Overcrowded Classes

How do you assist your instructors in handling overcrowded classes?

"With effective supervision, handling overcrowded classes should not be a matter of concern."

What is an overcrowded class?

"Any class lacking materials, equipment, supplies, and machines is overcrowded."

"Any class where the instructor has insufficient time to give the proper amount of attention to each pupil is overcrowded."

"The size of the class is not determined by an arbitrary figure but rather by adherence to good teaching procedure. A good supervisor will not tolerate other than good teaching procedure."

"The good supervisor will see to it that each of his instructors has adequate facilities for effectively teaching all of the students assigned to his class. The good supervisor will confer with his instructors to determine the number that can be adequately taught at one time and will see that this number is not exceeded except in an emergency and will do everything possible to assist the instructor in meeting it."

"Mutual confidence between instructor and supervisor will create an atmosphere of co-operation."

"Reduce size of class by removing all individuals who will not profit by instruction."

"By showing him how to organize his work through use of instruction sheets."

"Place experienced teacher with weak teacher to help him build up this technique."

"Provide special instructors to give related instruction well correlated with the practical work."

"Watch student progress, guide misfits into other classes, and move trainees at once as soon as acceptable to employer."

Helping With Shop Demonstrations

What help do you give instructors in conducting shop demonstrations?

"Do not encourage instructors who have substantial classes to do much group demonstrating. The individual approach is better."

"Put assistant with instructor to organize demonstration material under instructor's guidance. In one case we have a demonstration material program which parallels the instruction program, with a separate staff getting the material ready."

"We provide essential materials, supplies, and equipment such as visual aids and references."

"Obtain from industry and other sources unusual equipment and tools."

"Send for charts; invite demonstrators of special methods and processes from industries and sales agencies."

"Recommend procedures and methods when necessary and desirable."

Talking Over Heads of Learners

How do you keep instructors from talking over the heads of the learners?

"Sit in class with students and listen to lesson. After class period confer with teacher on pitch of instruction."

"Common fault of instructors newly out of training courses. Teach instructor to watch for lagging student interest."

"Talk with teachers concerning elementary teaching techniques; include discussion of this common fault."

"Require periodic examinations of trainees and submit them for inspection."

"By examination of and discussion of lesson plans."

(To be continued)

Printing as a Part of Occupational Therapy

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Among the many industrial activities incorporated into occupational therapy, printing is one of the most important. Printing as an occupational-therapy activity was introduced over 25 years ago. Since that time it has proved its worth in contributing to the recovery of persons suffering from a mental and/or physical ailment.

Most hospitals thoughout the country have added printing to their occupational-therapy programs. This activity has been found to stimulate the patient's mental processes, and aids in restoring the use of injured muscles and joints. In combination with this it offers an opportunity to the physically handicapped to become self-supporting in a well-paying industry.

In general medical hospitals, and in mental hospitals, printing is of primary importance in the treatment of cases where psychological adjustment and the restoration of physical functions is required. This activity definitely hastens the recovery of patients. In many psychiatric hospitals, printing has proved to be of great value in the treatment of mental and nervous disorders. The fact that mental and physical activity are necessary in printing is the principal reason for the many benefits obtained.

Printing in veteran administration and military hospitals is also important from another viewpoint. It offers many projects such as the printing of menus, record cards, announcements, etc. Many of these hospitals publish their own newspapers which open an avenue to many therapeutic activities such as news gathering, writing, typesetting, layout, printing, and distribution. There are many print shops operating in the army, navy, and veterans hospitals today where they are considered as furnishing most important activities in the rehabilitation programs.

Therapeutic Exercises of Printing

The areas benefited	*The different exercises performed*	*Setting type by hand*	*Using hand lever*	*Feeding press by hand*	*Using foot treadle on foot press*	*Cutting paper*	*Folding paper*
Thumb and fingers	Flexion	X	X	X		X	X
	Extension						X
	Abduction						
	Adduction	X		X			
Wrist	Flexion		X	X			X
	Extension		X	X		X	X
	Ulnar Deviation						X
	Radial Deviation						X
Forearm	Pronation		X				X
	Supination						X
Elbow	Flexion	X	X	X			
	Extension	X	X	X			
Shoulder	Flexion	X	X	X			
	Extension	X	X	X		X	
	Abduction						
	Adduction			X			
Hip	Flexion				X		
	Extension						
	Abduction						
	Adduction						
Knee	Flexion				X		
	Extension				X		

In the print shop, the patient receives mental satisfaction in producing something useful such as a printed program, bulletin, or a hospital newspaper. This satisfaction

is helpful in aiding the psychological readjustment of the patient. Along with this he is also receiving therapuetic exercise which is helping his physical restoration. For instance in handling a hand press, and feeding of the press the hands and upper extremities are put through many useful exercises which include flexion and extension, as well as abduction and adduction.

Printing has also been found to be of great therapeutic value as part of the occupational-therapy program in tuberculosis hospitals. Exercise for these patients must be kept at a minimum and must be of a nonstrenuous nature. However some mental and physical activity such as printing will be of benefit to those who must remain hospitalized for long periods. The publishing of a hospital newspaper is again a good project. It will hold the interest of the patients and also provide the occupational and diversional benefits toward which it is aimed.

Equipment in a tuberculosis print shop should be different from that found in the general medical hospitals. The hand press is out. All presses and other mechanical equipment must be operated by motors. The purpose of this is to eliminate any strenuous exercise on the part of the patient. Good ventilation, as well as good lighting is of paramount importance in the tuberculosis hospital print shop.

It is well to remember that printing as an occupational-therapy activity also serves another purpose. It helps to guide the patient toward a vocation in which he can become self-sufficient. There are several positions in which printing opens the door such as estimator, layout man, compositor, proofreader, pressman, etc.

It might be well to list some of the principal aims and objectives that should be strived for when using printing as an occupational-therapy activity:

a) To aid in the mental and physical rehabilitation and adjustment of the patient.

b) To provide exercise of a therapeutic nature for muscles of the legs, arms, hands, fingers, and body.

c) To create good habits of thinking and concentration.

d) To aid in building morale.

e) To center the patient's interest on the product being created and away from the injured area being exercised.

These are a few of the most important objectives to be followed by the occupational therapists in a print-shop program. If these objectives are used as a guide by the therapists a definite improvement in the patient's physical and mental progress is sure to follow.

Printing, because of the therapeutic exercise it provides for the disabled, as well as the numerous other mental and physical therapeutic benefits it offers, should be a part of every occupational-therapy program.

Vocational Education and Society

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(*Continued from page 415 of the December, 1947, issue*)

Rating Teachers

One of the responsibilities the director may have assigned to him is that of preparing for the superintendent a statement of the relative standing of each teacher on his staff. When this occurs it is necessary that he be in a position to determine the rating to be given each teacher on the basis of fact.

Value of Teacher Ratings

When these ratings are properly established they serve as effective aid to the teacher and to the administration.

1. *Value to the Teacher*

a) They serve to inform the teacher concerning the measure of his success as judged from the point of view of the director.

b) They should enable the teacher to make the most of his strong points and to improve those on which he is judged to be weak.

c) They should be a source of satisfaction to the teacher when he is rated high, and they should serve as a stimulus if the rating should happen to be low.

2. *Value to the Director*

a) They make it possible for the director to determine the relative value of his teachers.

b) They enable him to assign work to the teachers in those areas where they show their strength.

c) They may be used on some occasions as a basis for recommending promotions.

d) When there is no established salary schedule they may be used as a basis for determining salary adjustments.

How Should Ratings Be Established?

1. *Personal Opinion as a Basis*

A director may feel that he knows his teachers well enough to enable him to rate each teacher on the basis of this knowledge alone.

Obviously, this rating is more likely to be affected by the personal bias of the individual doing the rating. Another disadvantage lies in the fact that the rating given is a composite rating on a number of different and unrelated qualities. It is unfortunate that this method is used in so many cases.

2. *Observation of Teaching as a Factor*

One of the factors upon which a rating may be made is the reaction of the teacher to situations that arise in the classroom. If the director hopes to use these in deciding upon a teacher's rating it is important that he observe the teacher at work in the classroom. The more frequent these observations are made the better able the director is to make a fair evaluation of the ability of the teacher. The question of what the observer should look for will be considered later.

3. *Rating Scales, Another Factor*

Some directors have prepared rating scales on which they have arranged various criteria which they consider as being important when they are evaluating the worth of a teacher. It is probable that no two individuals would agree exactly on these criteria nor would they agree on the relative importance of those on which they could agree. However, each director may prepare his own rating scale using such items as he considers important. The important thing about using a scale is that it enables all concerned to determine exactly the basis upon which ratings are made.

A sample form used for this purpose is presented at the end of this section.

4. *Rating on Basis of Several Opinions*

The rating scale mentioned above is used in some cases by more than one individual, the final rating being a composite of all.

The director may rate the teacher himself; he may ask the principal to rate him; if there is a department head or a supervisor, they may be asked to submit ratings, and he may even ask the teacher to rate himself. These ratings are then combined and the final rating determined from them.

In addition to basing the final rating on the opinions of several individuals some directors follow the practice of collecting a number of evaluations made at different times during the school year. Each time the director visits a teacher he records his impressions of the teacher and his work on a card which he uses for that purpose. When he returns to his office this card is filed for reference at the end of the term or when teacher rating has to be done. During the year he may have visited the teacher a number of times with the result that he has on file a rating for each visit.

This practice tends to eliminate the possibility of a teacher being rated on the basis of the feeling of the director at the time the rating is done and establishes it on the basis of a number of different impressions gained at different times and under varying conditions. The following sample card is suggested as the type of card that might be used for this purpose. It represents what one director found suitable. The idea may be used elsewhere, however, by modifying the content to fit conditions existing in other localities.

RATING CARD

Board of Education

Dept. of Industrial Arts

Instructor .....

Shop ..... Date .....

1. *Condition of class*
   - *a*) At bench
   - *b*) At work
   - *c*) Interest
2. *Condition of room*
   - *a*) Temperature and ventilation
   - *b*) Material rack
   - *c*) Tool room and tools
3. *Condition of instructor*
   - *a*) Personal appearance
   - *b*) Was he on the job?
   - *c*) Attitude toward pupils
4. *Method of instruction*
   - *a*) Demonstration
   - *b*) Preparation
   - *c*) Use of opportunities
   - *d*) Character of assistance given

These cards are 3 by 5 and are used to check or record any impressions the director may have during his visit. In order to avoid embarrassment the director should avoid checking while he is in the classroom. However, it should be done as soon after leaving as is convenient and before the points to be checked are forgotten.

When the director registers these impressions at frequent intervals it is important that he take notice of the favorable points as well as of those he considers faults. It should be mentioned also that it may be found desirable to note only the unusual things — good or bad. When the cards are blank it may be assumed that everything observed was as it ought to have been.

5. *The Teacher and Teacher Ratings*

Regardless of the method used the teacher should be familiar with the factors considered in determining his rating. Because of this the director should discuss before his teachers the basis upon which his evaluation is made. This should be done at the beginning of the year so that the teachers may be in a position to adapt his actions to what the director considers important.

Any rating given will fail in one of its main purposes if the teacher is not informed in regard to the rating he is given. No teacher can hope to rank 100 per cent on every factor considered in his rating. It is almost certain that there are some factors upon which he will rate high while there will be others on which his rating will be relatively lower. If he is made aware of where the director considers him to be strong, as well as where he is considered weak, he is in a position to make the most of his strength and to improve those points on which he is weak.

In view of this it is important that the director discuss with each teacher the rating he has been given before it is made a matter of final record.

While it is important that each teacher know his own rating it is just as important that this information be considered confidential between him and those administrative officers who are concerned with such matters.

Who Should Set Up the Rating Plan?

In many cases the rating sheet is prepared by the administration and handed down to be used by the directors of various subjects. In other cases the director constructs his own rating sheet and bases it upon his personal feeling about the factors to be considered. In still other cases the teachers construct the scale, under the leadership of the director. When this last procedure is followed some of the disturbing features of teacher rating are removed since the teachers are less likely to resent an evaluation of their relative standing as compared with other teachers when they themselves have established the criteria upon which the measurements are made.

Factors to Be Considered in Rating Teachers

While no two directors will agree on all factors to be considered in rating teachers it is probable that there are a few factors which would be used by all. It is likely that many of the items in the following list would be found in any group of common elements. It is regrettable that the exact source of this list is unknown, however, it was prepared by a director, somewhere, who apparently was faced with the problem of evaluating the work of his teachers.

Factors to Be Considered in Rating Teachers

1. *Spirit and Attitude of the Pupils*

1. Is there a spirit of work and attention to business?
2. Is there the hum of industry or the buzz of idleness?
3. Is there an atmosphere of hilarity, mischief, and playfulness?
4. Does each pupil appear to understand what he is doing?
5. Does he appear to be interested in what he is doing?
6. Is there a spirit of drive and hustle, or a spirit of loafing?
7. Does the attitude, spirit, and atmosphere of the class change when the principal enters, or do they go on as before?

II. *Observation of Pupils*

1. At the beginning of the period, does each pupil get to work quickly?
2. Is each busy on some job?
3. Is everyone in his place?
4. Is each minding his own business?
5. Is there loitering or unnecessary talking or visiting?
6. Are any pupils wasting time around the toolroom, the stockroom, wash bowls, or drinking fountains?

III. *Observation of Teacher*

1. Is he alert to see and hear everything that happens?
2. Does he continually move about the shop among the boys to give criticisms and help, and to see that each is using his time to the best advantage?
3. Does he spend most of his time at his desk, or in his office, or in the tool- or stockroom?

IV. *Physical Conditions*

1. Is the shop well kept, clean and neat?
2. Are tools and machines well taken care of?
3. Is everything in place?
4. Are safety devices in use?
5. Is the stockroom well arranged and in good order?
6. Is the toolroom in good order?
7. Are tools sharp?
8. Are machines well placed?
9. Are boys and teacher properly dressed?

V. *Teacher's Executive Ability*

1. Does he have definite aims and objectives for his course?
2. Is his course well organized?
3. Does he have definite standards of attainment?
4. So far as practicable does he have lesson plans, or a definite plan for each day's work?
5. Is the work laid out according to pupils' interests and abilities?
6. Does he manage an orderly, well-regulated shop?
7. Does he have an efficient and expeditious method of issuing small tools and checking them in at the close of the period?
8. Does he have a place for each tool and keep it there?
9. Has he an orderly and efficient system of caring for and issuing stock, and other supplies?
10. Does he maintain good discipline?
11. Does he keep his shop clean and orderly?
12. Has he developed a spirit of co-operation and helpfulness on the part of his pupils?
13. Does he do all the routine work himself, or teach the students to do it?
14. Does he divide the dull and routine duties fairly among all pupils?
15. Is he businesslike in the sale of materials and supplies to students, and in accounting for money received?
16. Is he careful to prevent loss and breakage, and is he able to fix responsibility therefore on the proper person, and to secure reimbursement?
17. Does he handle all purely routine matters, like taking attendance, in an efficient and expeditious way?
18. Does he make reports promptly and in correct form?

VI. *Methods and Devices*

1. Does the teacher have a plan, and does he use it?
2. Does he use group instruction wisely and expertly?
3. Does he assign homework and reference work with good judgment?
4. Does he check up on all assignments to assure himself that the pupil has done his duty?
5. Is his manner toward pupils dignified, serious, and friendly?
6. Does he keep pupils from either disliking him or becoming too familiar?
7. Is he fair and just?
8. Does he require pupils to use textbooks?
9. Does he use job sheets or lesson sheets?
10. Does he use the lecture system?
11. Does he use the question and answer system of group recitation?
12. Does he use individual instruction whenever possible?
13. Does he use a progress chart?
14. Does he use exercises, or projects?
15. Does he allow each pupil to progress at his own rate?
16. Does he keep careful records of attendance, progress, quality of work, etc.?
17. Does he allow pupils to be tardy without rebuke?
18. Does he allow pupils to leave the shop during class periods?
19. Does he have models of good work for the pupils to see?
20. Does he make use of blackboards, posters, and charts?
21. Does he often demonstrate the best procedure and technique for the benefit of his pupils?
22. Does he read, teach, and inculcate carefulness and the use of all safety precautions?
23. Does he keep everyone busily at work in his own proper place?
24. Does he have a consistent system of grading?
25. Does he require pupils to clean up around their machines?
26. Does he use standard tests?
27. Does he teach good citizenship by precept and example, and especially by requiring good citizenship at all times?
28. Does he require boys to be careful not to waste materials and supplies?
29. Does he demand perfection of work where there ought to be perfection, and stress the process in cases in which perfection is unnecessary or impossible of attainment?
30. Does he give directions clearly and make sure that they are heard and understood?
31. Does he use good English?
32. Does he give the pupil the right kind of help, or does he do the job for the pupil?
33. Does he develop his most promising students into assistants, assigning them small responsibilities?
34. Does he make a careful analysis of each man's job, exercise, or project?
35. Does he take his classes on trips to the industries?
36. Is he at all times consistent, even tempered, and judicial?
37. Does he give a proper amount of related work and show the relations?
38. Does the teacher change his procedure due to the entrance of the principal, or continue as before?

VII. *Spirit and Attitude of Teacher*

1. Is he ambitious and anxious to improve?
2. Does he accept criticism and suggestions in the proper spirit?
3. Is he cordially willing to do more than he is paid for?
4. Does he keep pace with the progress of his trade?
5. Does he read the literature of his trade in books, magazines, and pamphlets?
6. Does he join educational associations and attend their meetings and conventions as fast as possible?
7. Does he visit other schools and classes whenever possible?
8. Does he attend teachers' meetings willingly and regularly? Does he participate in the discussions?
9. Does he write articles and make addresses so far as he is capable and opportunity offers?
10. Is he willing to do his share in the general operation of the school and in extracurricular activities?
11. Does he attend lectures and take extension work in higher institutions to improve himself?
12. Is he co-operative?
13. Does he have the interest of the school at heart?
14. Does he have the proper attitude toward other teachers and other departments?
15. Does he keep in touch with the industrial establishments in his city or vicinity?
16. Does he show an interest in his pupils after graduation and keep in touch with them?

(To be continued)

Defective or overheated heating equipment caused 60,000 fires in 1944. Check that furnace before winter comes.

A total of 15,750 killed and 540,000 injured in traffic accidents in the first six months of this year has been reported.

Accidents have jumped to fourth place as a cause of death. Topping accidents are heart disease, cancer, and cerebral hemorrhage.

Accidental deaths to workers on the job totaled 16,000 in 1945. Accidents to workers away from their jobs totaled 29,000, almost twice the on-job total.

Preventable accidents take a life every five and one-half minutes.

Approximately 60 per cent of all pedestrians killed by motor vehicles in 1945 were 45 years old and over, and 12 per cent were children from 5 to 14 years old.

Careless driving may wreck a fender — or a family!

Pedestrian deaths begin to rise in October as hours of darkness increase.

Connecticut, the grand award state in the 1946 National Traffic Safety Contest, had a traffic death rate of only half the national rate. If the rates of all states had been as low, more than 16,000 lives could have been saved. — *National Safety Council.*

Industrial Arts and Vocational Education

John J. Metz, Editor

READING HABITS OF STUDENTS

What are the reading habits of your students? Do they make use of the school library, the public library, and your shop library? Can you depend on them to follow the written directions which are on your instruction sheets? Have you ever quizzed them on the reading which they do in their spare time?

It may be a real eye opener for the average teacher to find out how diversified are the reading tastes of his students. He will find, no doubt, that some of the students, 12 to 16 years of age, read little beyond the ten-cent comic books shown in such generous numbers on the newsstands. Other students are voracious readers of mystery, romance, and adventure novels and magazines. Still others go in for more or less scientific and serious reading.

The shop teacher, because his instruction material frequently is, and preferably should be set up in written or printed form, should be vitally interested how well his students can translate the written word into action. A study of the reading habits and attainments of the shop students made at the beginning of the semester or year, will then show him fairly well what he can expect from each individual. It will also open up for him another avenue of approach to each of his students. There are many who need help and guidance to build up their reading skills and the shop teacher can frequently be of great assistance in rendering this important service.

Do not, therefore, wait for the teacher of English to make this study of your pupils. Do it yourself so that both you and your classes may profit from the information gained at the earliest possible moment.

WHY USE TESTS

One half of the school year 1947–48 is almost over. This may be a good time then for introspection and retrospection. The teacher's job has some aspects that are almost frightening. His every action, word, and thought leaves its imprint, for good or for evil on the minds of his students. The good teacher realizes the enormous responsibility which he carries on his shoulders, and he tries his best to make his influence beneficial.

But the best teacher is only human, and not infrequently there are lapses, not in any moral sense, but nevertheless, lapses which have their effect on the students.

Most notable are those acts of omission which the best of teachers make at times when they present their lessons or their demonstrations. The worst part of these omissions is the fact that something that was not taught, or only incompletely taught, may not show up until the end of the semester or of the school year.

Now then, have you missed anything important in your teaching of the 1947–48 classes? How do you know whether you did or did not? How are you going to find out?

A good test can help you locate loopholes you may have inadvertently left in your teaching. It is better to find the omissions now, rather than at the end of the year. With our students it is the same as with the doctor's clients — it is the patient that suffers from any mistake that is made.

Now, then, is the time to do testing. Study the subject; look around for good tests; try your hand at making some yourself; but above all — test, and keep on testing. It will help your students to become better students, and it will help you become a better teacher.

A CONFESSION AND A PLEA

In one of the issues during the past year, your editor found himself in a position where he had to fill a hole that had developed in his make-up, with little time to spare because the form in which the vacancy occurred was to go on the press in a hurry.

Under such conditions it happens at times that photographs sent in by teachers portraying life situations in their shops come in very handy. The folder containing a variety of such pictures is taken from the files, a picture is hurriedly selected, calculations for size of cut are made, and then the job is turned over to the engraver with an earnest plea for speed so that the form may be ready when the pressroom calls for it.

The haste with which all of this must be done presents many chances for error, although it does not excuse the mistakes that are made. On one of these occasions the photograph selected presented an interested group of students working together at a rather dangerous job. Everything would have been fine had these students worn the safety equipment which industry now prescribes for workers engaged in the operations pictured. Surely the editor was in error when he accepted the picture, and again when he published it. It was setting the wrong safety standards before other teachers and such students who might look through the magazine. However, this picture presented an actual situation. The students and the teacher shown were exposing themselves to serious danger. After the publication of this picture but one letter was received condemning its use, and that did not come from a teacher but from a man in industry.

Are we as industrial-arts and vocational teachers fully cognizant of all of the safety provisions that should be taught and made use of in the work which we are teaching? Ought we not be much more careful to give our students a proper knowledge of the safety precautions which industry expects its workers — our students — to make use of in their work?

A study of safety measures, devices, and clothing, might well be made a part of every shop course.

RELATED INFORMATION

Interesting bits of related information can be gleaned at times from technical and trade journals.

Items like the following, which were abstracted from *Steel Facts*, published by the American Iron and Steel Institute, will, for instance, interest students in the machine shop.

A typical turret lathe, which has a finished weight of about fifty-five hundred pounds will require approximately eight thousand pounds of iron and steel.

An analysis shows that the iron and steel will be in the form of cast iron, alloy steel forgings, alloy steel bars, carbon steel sheets and plates, carbon steel forgings, and carbon steel bars.

Similar items may be found for the students of other types of school shops. Use this material to make your related information more interesting.

Student Characteristics and Progress

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(*Continued from page 405 of the December, 1947, issue*)

Chart III is similar to Chart II in that it presents a picture of the group in terms of the characteristics under consideration. In this case the distribution shows the mechanical aptitude of the group as indicated by the Stenquist I raw scores.[13] The range of the all case distribution is 22 to 80 with a median of 42 and a Q. of 5.5. Again the distribution is skewed right, this time with a large pile-up between scores 35 and 48.

The distribution of dropouts before third term shows a more significant contrast to both the whole group with a tenure of four terms or more and with the graduates which again are coded for comparison. The five-point difference between dropouts before third term and graduates would appear to show a real advantage for higher Stenquist scores. We see that only two cases with scores over 50 dropped out before the third term, while 22 cases with scores over 50 stayed for four terms or more, and 12 of these were graduated. On the other hand, 16 per cent of those dropping out before the third term had scores below 30 while less than 6 per cent of those staying four terms or more, and only 4 per cent of the graduates had scores below 30.

As in Chart II, this distribution is grouped in fifths with inverse numbering for the purposes of correlation study.

Chart IV shows the distribution of a third characteristic, the interview rating. As explained by Novak,[14] this rating is given by a teacher interviewer at the time the applicant is given his other tests. The interviewer is a teacher in the trade for which application is being made and the rating represents the interviewer's opinion of the probable success of the applicant in his field. The ratings are from one to five, with one high. The interviewer bases his opinion on a seven- to ten-minute conversation with the applicant in which such matters as interests and previous school experiences are discussed.

Chart IV includes only the ratings of those applicants which were admitted to the curriculum. Only 15 cases, or 9.7 per cent of those admitted had ratings of 4 and 5. Of this group, 5 cases, or one third, dropped out before the third term, while 6 cases, or 40 per cent stayed to graduate. This appears to validate the practice of admitting applicants with low interview ratings when other characteristics are contrary to the interview rating.

Of those cases having a tenure of over three terms, 64, or 61 per cent had ratings of 1 or 2. On the other hand, of those cases with a tenure of less than three terms, 15 cases, or only 45 per cent have a rating of 1 or 2. The percentage of those who are graduated who had a rating of 1 or 2 is 72 per cent. In other words, while a low rating is not a significant predictive of failure, a high rating gives good indications of probable success.

Chart V shows the distributions of the fourth characteristic used in this study: previous school grades. Three distributions are shown: shop grades; classwork — group A, including the average of science and mathematics marks in the ninth year; and classwork — group B, including the average of English and social studies marks in the ninth year. By coding the distributions is shown the relative standings of those cases having a tenure of less than three terms. The distribution of shop marks is definitely skewed to the right while classwork — group B is skewed to the left and classwork — group A is almost normal. Eighty-two per cent of the shop grades were G or better while only 51 per cent of the classwork — group B grades were G or better. Although all three previous school grades are discriminating so far as tenure is concerned, classwork — group B is the most discriminating. No pupil who stayed less than three terms had an E in classwork, and only two cases, or 7 per cent, had E's in shop. Sixteen cases who had F or P in shop, or 55 per cent, had a tenure of less than three terms. On the other hand, 27 cases, or 75 per cent of those with a tenure of less than three terms had grades of F or P in classwork — group B.

Comparing those cases with less than three terms' tenure, to those with four or more terms' tenure, we find similar predictive qualities. Seventy-three per cent of those cases having F or P in shop had a tenure of less than three terms. Eighty-three per cent of those failing classwork — group A, and 57 per cent of those failing classwork — group B, had a tenure of less than three terms. Forty-two per cent of those having F or P in classwork — group A had a tenure of less than three terms, while only 10 per cent of those having E or G in classwork — group A had a tenure of less than three terms. Only 12½ per cent of those having G or E in shop, as distorted as this distribution is, had a tenure of less than three terms.

Chart VI includes a group of scattergrams made to discover the significance of mental ability (I.Q.) as a predictive characteristic. For the purpose of plotting these diagrams, the cases were grouped into fifths on the basis of I.Q., as shown in Chart II. In order to parallel the interview rating system, the numbering is inverse with the groups ranging as follows:

Group 1 — over 122
Group 2 — 116 to 122 incl.
Group 3 — 109 to 115 incl.
Group 4 — 104 to 108 incl.
Group 5 — under 104

Scattergram (*a*) showing relationship between I.Q. and shop grades, shows a low positive correlation. Scattergrams (*b*) and (*c*) showing relationships between I.Q. and classwork — groups A and B respectively, are also positive and somewhat higher. While these scattergrams do not indicate high discrimination for the characteristic I.Q., it must be borne in mind that all of the I.Q.'s are relatively high with none under 91 and 91 per cent with I.Q.'s of 100 and over. At the same time, we may well make two other deductions. First, from the fact that 75 per cent of the shop failures have I.Q.'s over 109 it seems apparent that other factors than mental ability, such as aptitude and interest, determine success in this phase of the work. Second, from the number of cases in the lower two fifths obtaining marks of G and E, as compared to those obtaining F and P, it would seem that the work could be made increasingly difficult, especially as regards work involving problem solving.

Scattergram (*b*) showing relationship between I.Q. and interview rating was made to discover to what extent the interviewers were sensitive to the mental ability of the applicants. Again we find the correlation positive, but low. It would seem that other matters influenced the interviewer more than whatever he could detect of the I.Q.

Scattergram (*c*) showing relationship between I.Q. and tenure, in terms, is also

[13] Stenquist Mechanical Aptitude Test, Test I, *op. cit.*
[14] Novak, B. J., *Interviewing the Prospective Student, op. cit.*

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positive and the lowest of the five correlations on this chart. Again, this indicates that factors other than I.Q. influence the length of time spent in this curriculum.

From the foregoing and a close examination of the five scattergrams, we see that for individual cases I.Q. alone, within the range studied, cannot be used as a reliable index of probable success. To the extent that the correlations are positive this characteristic would enter into the selection between cases where other characteristics are equal, or when the I.Q. is in agreement with the other characteristics. Thus, if there were two cases with similar school records, mechanical aptitude scores, and interview ratings, of which only one could be admitted to the curriculum, we should be justified in making the choice on the basis of I.Q.

Chart VII is similar to Chart VI in that its results are positive and low. For the purpose of determining the significance of mechanical aptitude, as indicated by the raw scores of Stenquist Mechanical Aptitude Test I, in predicting success of pupils in this curriculum and in relation to other characteristics, five scattergrams have been plotted. For this purpose, the raw scores of the Stenquist test have been grouped in fifths as shown on Chart III, with inverse numbering to match the interview rating system. The ranges of these groups are as follows:

Group 1 — over 49
Group 2 — 45 to 49 incl.
Group 3 — 40 to 44 incl.
Group 4 — 36 to 39 incl.
Group 5 — under 36

Scattergrams (*a*) and (*b*) show the relationship between mechanical aptitude and shop grades and classwork groups A and B respectively. Both show somewhat lower correlations than those for I.Q. and these grades. Thus, a pupil has almost an equal chance of failing whether he be in any one of the five groups, and only a slightly better chance of getting E with a high score. Examination of these two scattergrams would lead to one of two conclusions. Either this test does not measure mechanical aptitude as required by this type of work, or, factors other than mechanical aptitude enter into determining the success of pupils in this curriculum. From the somewhat higher results shown in scattergram (*b*), we might safely assume that the first conclusion is most valid, for we should expect that mechanical aptitude would show more effect on shop grades than on classwork.

Scattergrams (*c*) and (*d*) showing relationship between Stenquist scores and I.Q. and interview rating, respectively, were made to detect the relationship, if any, among these three factors. As might be expected from other studies, the correlation between mechanical aptitude and I.Q. is positive and extremely low. That for interview rating is only slightly higher. These, and (*d*) on Chart VI would suggest that whatever the predictive qualities of these three characteristics, they are quite independent of each other. That is, we find little tendency for many cases to be consistently high or low in all three, or even in any two, although in cases of individual incidence we might find some significance. To explore the possibility of significance in incidence of these ratings Charts XII and XIII have been constructed, and will be discussed in turn.

Scattergram (*e*) shows the relationship between mechanical aptitude and tenure, in terms. Here again the correlation is positive and low. As compared with (*e*) on Chart VI there is little choice. Those cases with low Stenquist scores have somewhat less chance of surviving than do those with higher scores. For instance, 21 per cent of those with scores over 44 had a tenure of less than three terms, while 45 per cent of those with scores under 40 had a tenure of less than three terms.

In order to detect any special correlation of cases with very low scores, those cases in the lowest fifth having scores under 30 were specially coded with a solid block. In scattergrams (*a*) and (*b*) we find significant relationship with lower grades for these low score cases. In scattergram (*a*), 45 per cent of those with grades of F and P had scores lower than 30, while only 22 per cent of those with grades of E and G had scores lower than 30. In like manner, in scattergram (*b*), 35 per cent of those with grades of F or P had scores lower than 30, while only 25 per cent of those with grades of E and G had scores lower than 30. It appears that the correlation of these low scores is much less significant in the remaining three scattergrams. . . .

Chart VIII shows the relationship between interview rating and (*a*) shop grades, (*b*) classwork (Groups A and B), and (*c*) tenure. Of all the scattergrams included in this study, these show the highest correlations. In scattergram (*a*), only 11 per cent of those rated 1 received grades less than G in shop while 72 per cent of those rated 4 received grades less than G in shop and both cases rated 5 failed in shop. Even between those rated 2 and 3 there is significant discrimination. Sixty-eight per cent of those rated 2 received grades of G or E while only 48 per cent of those rated 3 received grades of G or E.

Scattergram (*b*) shows a somewhat lower correlation than does (*a*), possibly reflecting the tendency of the shop-teacher interviewer to consider traits having greater bearing on shopwork than on classwork. Seventy per cent of those rated 1, 51 per cent of those rated 2, 29 per cent of those rated 3, 21 per cent of those rated 4, and none of those rated 5 received grades of G or E in classwork.

Scattergram (*c*) includes only those cases which are no longer active in order that interpretation would not be confused by cases whose actual tenure can not be predicted. We find that 88 per cent of those with rating of 1, 74 per cent of those with rating of 2, 54 per cent of those with rating of 3, and 63 per cent of those with rating of 4, have a tenure of more than three terms. While the lower number of cases having a rating of 4 makes this result less reliable, it appears that a rather high percentage of those so rated survive in spite of lower grade of performance. However, this rating does have a greater significance in detecting those extremely low tenure cases. None of those rated 1, 6½ per cent of those rated 2, 14 per cent of those rated 3, and 28 per cent of those rated 4, remained in the course for less than one month.

It would appear from the foregoing that in the five to ten minutes devoted to the interview upon which this rating is based, the interviewer is able to learn considerable about the probable future of the applicant in this curriculum. As compared to the results shown for the aptitude and mental ability rating, the interview rating is a much more significant instrument for selecting these pupils. While the distributions of ratings given as shown in Chart IV appear to have a skewed pile-up of 2 ratings, these scattergrams would seem to justify the teachers' judgments. . . .

Chart IX was drawn as an aid in interpreting other charts in the series which refer to the grades earned at Dobbins. These distributions show the proportions of each grade for shop and classwork. By coding, a distinction is made between those cases with less than three terms' tenure and those with four or more terms.

The shop grades earned are higher than class grades, with higher marks earned in group B than in group A classwork. As might be expected, lower grades are characteristic of low tenure. In this respect, shop grades are the most discerning, with only 2 of the low tenure group earning grades of G and E. Twenty-eight per cent of those receiving F, and all of those receiving P in shop dropped out before the third term, while 18 per cent of those receiving F in classwork group A dropped out that early. Thus, while shop marks

tend to be higher, the low grades are earned by those who are unable to persist, for one reason or another.

In an attempt to find out whether those who do well in shop at Dobbins also do well in classwork, and vice versa, the scattergrams in Chart X were constructed. Scattergram (1) shows the relationship between shop grades and classwork, group A. The correlation is positive and fairly high, with only five cases varying more than one grade out of correlation and 49 per cent of the cases in perfect correlation.

Scattergram (2) shows the relationship between shop grades and classwork group B. This correlation is also positive and but slightly lower than (1) with seven cases varying more than one grade out of correlation and 47 per cent of the cases falling into perfect correlation. . . .

(To be continued)

Teaching Materials for Industrial Education

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(Continued from page 419 of the December, 1947, issue)

BULLETINS AND BOOKLETS

Metal

Aluminum Company of America, Pittsburgh 19, Pa.
- *Alcoa Aluminum and Its Alloys*
- *Alcoa Structural Handbook* — $1.25 (special price to engineering students, 75 cents)
- *Aluminum Casting Alloys*
- *Aluminum in Aircraft*
- *Aluminum in the Chemical Industry*
- *Aluminum — Its Story*
- *An Outline of Aluminum*
- *Finishes for Aluminum*
- *Forming Aluminum*
- *Machining Alcoa Aluminum*
- *Riveting Alcoa Aluminum*
- *Welding and Brazing Alcoa Aluminum*

Aluminum Cooking Utensil Co., New Kensington, Pa.
- *The Correct Use and Care of Aluminum Utensils*
- *Institutional Utensils, Their Selection and Use*
- *Wear-Ever Steam Jacketed Kettles*

Aluminum Goods Mfg. Co., Manitowoc, Wis.
- *A Short Story of Aluminum from Clay to Cooking Utensil*

American Brass Co., Waterbury 88, Conn.
- *Anaconda Pipe — Copper Tubes and Fittings*
- *Anaconda Copper and Copper Alloys*
- *How to Protect Your Home Against Rust*

American Institute of Steel Construction, Inc., 101 Park Ave., New York 17, N. Y.
- *Steel Construction Digest* — (quarterly bulletin)

American Iron and Steel Institute, 350 — 5th Ave., New York 1, N. Y.
- *The Picture Story of Steel*
- *Steel Serves the Farmer*
- *Steel — Pacemaker for Peacetime*
- *Who Gets What?*
- *Steel Facts* (bimonthly publication)

American Welding Society, 33 West 39th St., New York 18, N. Y.

Code of Minimum Requirements for Instruction of Welding Operators:
- *Part A — Arc Welding of Steel,* 1945 edition — 50 cents
- *Part B-1 — Oxy-Acetylene Welding of Steel Aircraft,* 1944 edition — 50 cents
- *Lessons in Arc Welding,* The Lincoln Electric Company, 1941 edition — 50 cents plus postage
- *Training of Welding Operators,* Air Reduction Sales Company:
- *Oxy-Acetylene Welding* (lectures) — $1 plus postage
- *Oxy-Acetylene Welding* (exercises) — $1 plus postage
- *Arc Welding* (lectures) — $1 plus postage
- *Arc Welding* (exercises) — $1 plus postage
- *Aircraft Welding* (exercises) — 50 cents plus postage

(Books may be purchased separately or in sets of four for $3.50 plus postage)
- *Training Oxy-Acetylene Welding and Cutting Operators* (instructor's outline) — 25 cents
- *Standard Qualification Procedure,* 1941 edition — 40 cents
- *Welding Symbols and Instructions for Their Use,* 1942 edition — 25 cents
- *Definitions of Welding Terms and Master Chart of Welding Processes,* 1942 edition — 40 cents
- *Inspection Handbook for Manual Metal-Arc Welding,* 1945 edition — $1.50
- *Procedure Handbook of Arc Welding Design and Practice,* Lincoln Electric Co., 8th edition — $1.50 in U. S.; $2 elsewhere
- *The Oxy-Acetylene Handbook,* The Linde Air Products Co. — $1.50 plus postage

Armstrong-Blum Mfg. Co., 5700–5800 West Bloomingdale Ave., Chicago 39, Ill.
- *General Catalog C–48 Marvel Saws*
- *Cutting Tool Bulletin HS–48*

Atkins and Co., E. C., 402 South Illinois St., Indianapolis 9, Ind.
- *Saw Sense*
- *Guide to Metal Cutting Efficiency*
- *Directions for Fitting Narrow Band and Small Circular Saws*

Atlas Press Co., Kalamazoo 13D, Mich.
- *Manual of Lathe Operation and Machinists' Tables* — $1

Behr-Manning Corp., Troy, N. Y.
- *Coated Abrasives in the Plastics Industry* (supplement to a lecture course on coated abrasives)
- *Sandpaper — Its How and Why*
- *How to Sharpen*
- *Shop Projects* (sets of eight shop projects on abrasives, covering coated abrasives, oilstones, manufacturing, selection, and application)

Bethlehem Steel Co., Bethlehem, Pa.
- *Bethlehem X, XCL, XX and XXX Tool Steels*
- *Bethlehem No. 57 Hot Work, No. 57 Special Hot Work Tool Steels*
- *Bethlehem Tool Room Oil Hardening Tool Steel*
- *Bethlehem Lehigh Die and Tool Steel*
- *Bethlehem Air-Hardening Tool Steel*
- *Bethlehem Omega Tool Steel*
- *Bethlehem 66 High Speed Tool Steel*
- *Mayari R*
- *Typical Installations Test Data* — Details of Bethlehem H-Piling
- *Bethlehem Steel Sheet Piling*
- *Bethlehem Bar Supports and Spacers*
- *Bethlehem Concrete Reinforcing Bars*
- *Steel for Highways*
- *Bethlehem Open-Web Steel Joists*
- *Bethlehem Steel Ties*
- *Bethlehem Switch Stands*
- *Better Castings*
- *Your Land*
- *Ruralductor*
- *The Production of Bethcolite*
- *Bethlehem Steel Mine Ties*
- *Steel in the Making*
- *Properties of Frequently Used Carbon and Alloy Steels*
- *An Introduction to Shipbuilding*

Design for Homes
Typical Installations of Bethlehem Steel Sheet Piling

Blackhawk Mfg. Co., Milwaukee 1, Wis.
Blackhawk Hydraulic Equipment
Wrenches

Breuer Electric Mfg. Co., 5100 N. Ravenswood Ave., Chicago 40, Ill.
Circular on Tornado Vacuum Cleaners, Electric Blowers, and Etchers and Dust Collectors and Floor Machines

Brodhead-Garret Co., 4560 East 71st St., Cleveland 5, Ohio
Brodhead-Garret Company Catalog, 1946–47

Bullard, 286 Canfield Ave., Bridgeport, Conn.
Cut Master Vertical Turret Lathe 30, 36, 42, 54, 64, and 74-in. sizes
Man-Au-Trol Vertical Turret Lathe 30, 36, 42, and 54-in. sizes
Man-Au-Trol Spacer 30 by 20-in., and 4 by 4-in.
Type "D" Mult-Au-Matic Lathe 8, 12, 16, and 16–23-in.
34-in. Mult-Au-Matic Lathe
3-Spindle Man-Au-Trol Horizontal Lathe Model 30-H

Carboloy Co., Box 237, Roosevelt Park P.O., Detroit 32, Mich.
What is Carboloy Cemented Carbide? — 5 cents
Designing Carboloy Tools — 5 cents
Brazing Carboloy — 5 cents
Chip Breakers — 5 cents
Grinding Carboloy — 5 cents
Putting Carboloy Tools to Work — 5 cents

The Carborundum Co., P.O. Box 337, Niagara Falls, N. Y.
The Abrasive Tools of Industry
What a Grinding Wheel Does
Standard Grinding Wheel Shapes
The Grinding Wheel as a Production Tool
Classes of Grinding Operations
Wheel, Work and Machine Movements — I
Wheel, Work and Machine Movements — II, III
Stresses Due to Wheel, Work and Machine Movements
Stresses Due to Contact Between Wheel and Work
The Disposal of Chips
Grinding Wheel Safety
Wheel Balancing
Dressing and Truing Tools
Dressing and Truing Procedures
Wheel Marking Symbols
Center Type Cylindrical Grinding — I, II
Centerless Type Cylindrical Grinding — II
Surface Grinding
Internal Grinding
Cutting Off
Snagging and Off-Hand Grinding
Causes and Corrections of Common Grinding Errors
Coated Abrasives
Polishing Grains

Carpenter Steel Co., Reading, Pa.
Tool Steel Simplified, 1st edition (limited supply) — $1 postpaid in U. S. A. $3.50 elsewhere
Tool Steel Simplified (revised and enlarged), available soon — $2 postpaid in U. S.

Carrier Corp., Syracuse 1, N. Y.
Educational publications on air conditioning, refrigeration, and industrial heating

Chicago Rivet and Machine Co., 9600 West Jackson Blvd., Belwood, Ill.
Brake Lining Rivet Price List No. 64
Brake Lining Machine Tool Page No. 72
Tubular and Split Industrial Rivets Price List No. 35

Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio[5]
Cutting Gear Teeth on a Milling Machine M-1397
Milling Machine Practice M-773-I
Automatic Milling Control Systems M-1477
Milling with High Speed Steel M-1160
Physics of Metal Cutting M-825
Chip Formation, Friction and Finish M-989
An Analysis of the Milling Process M-1421
High Speed Milling with Negative Rake Angles M-1330
Recommendations for High Speed Carbide Milling M-1376
The Inclination of the Cutting Edge and Its Relation to Chip Curling M-1427
How to Run a Milling Machine M-1359
Mechanics of the Metal Cutting Process
Basic Mechanics of the Metal Cutting Process M-1374
Initial Contact of Milling Cutter and Work Piece M-1455
Nomographs for Analysis of Metal Cutting Processes M-1467
Explaining the "Centerless Principle with Wood Model G-509
Principles of Centerless Grinding G-503-I
Precision Cylindrical Grinding G-397-1
A Review of the Grinding Theories G-450
The Use of Abrasives for Removing and Finishing Metals G-465
Filmatic (spindle bearings used on all Cincinnati grinders) *G-446*
Recommendations for Grinding Cutters for High Speed Carbide Milling M-1377
Cutter Sharpening Practice M-1245
Interesting Applications of No. 2 Cutter Grinder M-1296
Broaching vs. Milling M-1383
Well Founded Handling Practices M-1480
Machining with Single Point Tools M-881
Reclaiming Foundry Sand by the Wet Method M-1353
Hydraulic Control and Feeding Mechanisms for Machine Tools M-1001
Lubrication of Milling, Grinding, Broaching, Lapping, and Cutter Sharpening Machines M-1084-2

Cincinnati Shaper Co., Cincinnati, Ohio
Operator's Manual — Cincinnati Brakes
Operator's Manual — Cincinnati Shapers
Operator's Manual — Cincinnati Shears
Cincinnati All-Steel Shears (catalog)
Cincinnati Shapers (catalog)
Cincinnati Press Brakes (catalog)
Setups on Cincinnati Shapers (educational bulletin)

[5]Single copies of all this material free to teachers; when ordered in quantities, 10 cents per copy.

Fundamentals of Press Brake Dies (technical bulletin)
Series of leaflets describing Cincinnati Shaper Company machines

Cleveland Twist Drill Co., Public Relations Dept., 1242 East 49th St., Cleveland 14, Ohio
Handbook for Drillers

Clover Mfg. Co., Norwalk, Conn.
Handbook, Coated Abrasives
Coolants for Abrasive Belts, Bulletin No. 1
Testing Coated Abrasives, Bulletin No. 3
Belt Sanding of Metal, the Polishing Lathe, Bulletin No. 4
The Effect of Moisture on the Work Value of Glue-bonded Coated Abrasives, Bulletin No. 5
Abrasive Disc Sanders . . . A Study . . .
Method of Finishing Open-End Wrenches on the Polishing Lathe, Bulletin No. 6
Post-War Catalog (containing entire section of technical information on coated abrasives)

Copper and Brass Research Association, 420 Lexington Ave., New York 17, N. Y.
The History of Copper and Brass: Man's Most Useful Metals

Delta File Works, 4837 James St., Philadelphia 37, Pa.
Files, How to Select Them, Use and Conserve Them
Catalog No. 47, Delta "Hand Files"
Catalog — Delta Rotary Files

Electro Metallurgical Co., Unit of Union Carbide and Carbon Corp., 30 East 42nd St., New York 17, N. Y.
Electromat Products and Service
Alice in Alloyland
Stainless Steels and Their Uses
Use of Stainless Steel in Hospitals
Stainless Steel — A Modern Aid to the Food Industry

Famco Machine Co., 18th & Holborn Sts., Racine, Wis.
Literature on Famco Arbor, foot presses, and foot-powered squaring shears

Fellows Gear Shaper Co., Springfield, Vt.
The Involute Gear — 23 cents
The Internal Gear — 29 cents
The Art of Generating with a Reciprocating Tool — 60 cents

Ford Motor Co., Johansson Division, 3000 Schaefer Road, Dearborn, Mich.
He Measured in Millionths — Story of C. E. Johansson
General Catalog

Fosdick Machine Tool Co., Cincinnati 23, Ohio
Fosdick Jig Borer
Fosdick Heavy Duty Upright Drills
Fosdick High Speed No. 4BM, 5BM Drills
Economax Hydraulic Radials

Globe Steel Tubes Co., Milwaukee 4, Wis.
Design for Strength, Lightness, Appearance, Economy
Globeiron Seamless Pressure Tubing No. 113
Globeiron Seamless Tubing No. 109A
Globe Stainless Steel Tubing No. 115
Bulletin No. 103-C (general catalog)

Bulletin No. 300-R (stainless analyses chart)

Handy and Harmon, 82 Fulton St., New York, N. Y.
- *Silver for the Craftsman*
- *Making Hand Wrought Sterling Silver Jewelry* — free to teachers; $1 to students[6]

Heller Brothers Co., 865 Mt. Prospect Ave., Newark 4, N. J.
- *Nucut Files — 100 Years of Experience* (1936 publication, 100 Year Anniversary Catalog, extra size)
- *F-45 File Catalog*
- *T-44 Tool Catalog*
- *Rotary File Catalog*

Hobart Brothers Co., Hobart Square, Troy, Ohio
- *Complete Catalog on Arc Welding Equipment*
- *Complete Accessory Catalog on Arc Welding Supplies*
- *Arc Welding Rod Catalog*
- *Simplified Arc Welding and the Hundred Ways it Pays*
- *Welder's Vest Pocket Instruction Guide*
- *A Trip Through the Hobart Welding Trade School*
- *Hobart Welding Instructions*
- *How to Build Your Own Gas Drive Welder*
- *How to Start and Operate a Job Welding Shop at a Profit*
- *Carbon Arc Welding*
- *Practical Lessons Book* — 75 cents
- *Practical Arc Welding* — $2
- *Practical Designs in Arc Welding* (3 volumes) — $3.50 each or set of 3 for $10

Hydraulic Press Mfg. Co., Mount Gilead, Ohio
- *The Hydraulic Press, No. 36, 37, 38*
- *Hydro-Power Hydraulic Pressure Generators, Controls, Valves and Complete Hydraulic Power Units, No. 460*
- *Fastraverse Metal Working Presses, No. 4206*
- *The H.P.M. Closed Circuit Fastraverse System of Press Operation, No. 4400*
- *The H.P.M. All-Hydraulic Metal Stretching Press, No. 4401*
- *All-Hydraulic High Pressure Die Casting Machines for Magnesium, Aluminum, Copper and Zinc Alloys, No. 4402*
- *Fastraverse Presses for Powder Metallurgy, No. 4406*
- *All-Hydraulic Forging Presses for Closed Die and Flat Die Forging of Ferrous and Non-Ferrous Metals, No. 4407*
- *All-Hydraulic Presses for Metal Working and Process Industries, No. 4602*
- *H.P.M. All-Hydraulic Presses for Modern Pressure Processing, No. 4500*
- *H.P.M. Presses for Compression and Transfer Molding of Plastics, No. 4702*
- *H.P.M. Turbojector for Injection Molding of Rubber, No. 4601*
- *H.P.M. Plastics — The Pressure Processing of Synthetic Resins, No. 4404*
- *All-Hydraulic Plastics Injection Molding Machines, Model 350-H-16, No. 4405*
- *All-Hydraulic Plastics Injection Molding Machines, Model 250-H-9, No. 4503*

[6]May be purchased from tool companies.

Inland Steel Co., 38 So. Dearborn St., Chicago 3, Ill.
- *How Steel Is Made*

International Acetylene Association, 30 East 42nd St., New York, N. Y.
- *Oxy-Acetylene Cutting* — 25 cents
- *Oxy-Acetylene Welding and Its Applications* — 35 cents
- *Miscellaneous Uses of the Oxy-Acetylene and Air-Acetylene Flames* — 15 cents
- *Welding Codes and Specifications* — 15 cents
- *Sample Pipe Welding Specifications* — 10 cents
- *Tests for the Selection of Welding Operators* — 20 cents
- *Bronze Welding or Brazing of Iron and Steel by the Oxy-Acetylene Process* — 20 cents
- *The Effect of Flame Cutting on Steel* — 25 cents
- *Hard-Facing by the Oxy-acetylene Process* — 25 cents
- *Safe Practices for Installation and Operation of Oxy-Acetylene Welding and Cutting Equipment* — 25 cents
- *Flame-Hardening by the Oxy-Acetylene Process* — 20 cents
- *Training Oxy-Acetylene Welding and Cutting Operators,* Instructor's Outlines including Course Outline for Inspectors — 25 cents

Johnson Gas Appliance Co., Cedar Rapids, Iowa
- *Catalog No. 47*

Kearney and Trecker Corp., Milwaukee 14, Wis.
- *Methods of Cam Milling* — 25 cents

Milling Practice Series:
- *Book I. Right and Wrong in Milling Practice* — 25 cents
- *Book II. The Milling Machine and Its Attachments* — 25 cents

R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio
- *Running a Regal* — 25 cents
- *Visual Demonstrator* — $1
- *Regal Lathe Bulletins for sizes 13", 15", 17", 19", 21", and 24"*
- *Regal Attachments Folder*

Instruction Books:
- *Heavy Duty Engine Lathes 12" to 18" size*
- *Gap and Sliding Bed Gap Lathes 12" to 18"*
- *Tool Room Lathes, 12" to 18"*
- *Heavy Duty Engine Lathes, 25" to 32", 40" to 50"*
- *Rapid Production Lathes, 13" size*
- *Rapid Production Lathes, 17" to 20" size*
- *Automatic Lathes*
- *Cutter Grinder*
- *10 Work Jobs*

Lindberg Engineering Co., 2450 West Hubbard St., Chicago, Ill.
- *Bulletin 53. Lindberg Gas Fired Tempering Furnace*
- *Bulletin 95. Hydryzing for Hardening*
- *Bulletin 95 hs. Lindberg Hydryzing Furnaces*
- *Bulletin 130. Lindberg Super-Cyclone*
- *Bulletin 140. Lindberg Furnaces for the Heat Treatment of Aluminum and Magnesium*
- *Bulletin 190. Lindberg Controlled Atmospheres for Heat Treating*
- *Bulletin 201. Lindberg All-Purpose Brazing Furnaces*
- *Bulletin 210. Lindberg Continuous Production Brazing Furnaces*
- Bound Book: *Industrial Controlled Atmospheres* — $1

Linde Air Products Co., 30 East 42nd St., New York 17, N. Y.
- *Linde Oxy-Acetylene Processes* (1 copy per instructor)
- *Oxy-Acetylene Welding Data* (1 copy per instructor)
- Synthetic Sapphire Production
- *The Oxy-Acetylene Handbook* — $1.50 (subject to educational discount)

Lufkin Rule Co., Saginaw, Mich.
- *Catalog No. 7 — Precision or Machinists Tools*

Lyon Metal Products, Inc., Aurora, Ill.
- *General Catalog, Lyon Steel Equipment*

Mead Specialties Co., Inc., 4114 No. Knox Ave., Chicago 41, Ill.
- *Mead Industrial Air Power*
- *Industry's Tested Tool — "Bandsander"*
- *18 Ways to Save Time and Money with the Mead Industrial Burring Machine*

Metal Goods Corp., 16 Drennan, Houston 1, Tex.
- Publication: *Nickelsworth*
- Folder: *Metal Supplies and Sources*

Metal Goods Corp., 5239 Brown Ave., St. Louis 15, Mo.
- *Imperial Tube Fittings Bulletin*
- *Making Aluminum Trays and Coasters*
- *Handicraft Metal Price List*

National Tube Co., Pittsburgh 30, Pa.
- *Pipe and Tubes in the Making*
- *Correct Pipe Threading Principles*

Niagara Machine & Tool Works, 637–697 Northland Ave., Buffalo 11, N. Y.
- *Niagara No. 106 Booklet,* covering power machines such as presses, punches, squaring shears, rotary shears for heavy industry
- *Niagara No. 200-E Booklet,* covering light capacity machines and tools for sheet metal shops
- *Niagara No. 103-C Bulletin,* covering equipment and floor plans suitable for vocational school sheet metal classes

O'Neil-Irwin Mfg. Co., Minneapolis 15, Minn.
- *Di-Acro System of Die-Less Duplicating for Benders, Brakes and Shears, Catalog No. 47–12*

Peck, Stow, and Wilcox Co., Southington, Conn.
- *Bulletin on Sheet Metal Work No. SB35*

Pereny Equipment Co., Columbus 8, Ohio
- *Pereco Electric Furnaces and Heat Treating Equipment*

Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh 22, Pa.
- *Color Dynamics for Buildings*
- *Pittsburgh Color Dynamics for the Home*
- *Pittsburgh Color Dynamics — The Scientific Utilization of the Energy in Color to*

Promote Efficiency in Industry

Revere Copper and Brass, Inc., 230 Park Ave., New York 17, N. Y.
(Single copies of the following available to teachers)
Magnesium — the Light Weight Metal for a Multitude of Uses
Partners in Revere
The Spirit of Paul Revere
Is It Costing You Too Much to Heat Water?
Revere Architectural Shapes and Sheets
Revere Standard Copper for Building Construction
Revere Pipe and Tube
Revere Copper and Copper Alloys
Uplifting the Downtrodden
The Living Kitchen Where Drudgery is Banished
A Monument the Living Can Use
Making Better Health Available to All
Livable Homes for Those Who Love Living
A Children's Center or Nursery School
The Airplane Helps Build This House
A Hillside Built This House
Why City Planning is Your Responsibility
A Citizens Country Club or Leisure Center
A Flexible House for Happier Living
Preview of a New Way of Life
Your Children Could Romp Here While You Shop
Home for a Nation on Wings
A House With a Future
After Total War Can Come Total Living
Homes to Enrich Our National Standard of Living
Homes for Tomorrow's Happy Living
Apartment Homes for Tomorrow's Better Living
A Higher Living Standard at Lower Cost
Better Homes for Lower Incomes
New Homes for Better Living
Tomorrow's Homes for the Many
Researching for a New Standard of Living
A House With No Kitchen
Paul Revere Historical Prints
Revere Magnesium Alloys: A Summary of Characteristics and Applications

Rivett Lathe and Grinder, Inc., Brighton 35, Boston, Mass.
Bulletin 500D

Sheldon Machine Co., Inc., 4258 N. Knox Ave., Chicago 41, Ill.
The Care and Operation of a Lathe — paper cover, 50 cents; fabricoid cover, 75 cents

Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Simonds Abrasive Company Mounted Wheels and Mounted Points
Grinding Wheel Data Book

South Bend Lathe Works, South Bend 22, Ind.
Modern School Shops, 3rd ed.
The Hand
Keep Your Lathe Clean
Oiling the Lathe
The Installation and Leveling of the Lathe
The South Bend Machine Shop Course for Apprentice Training, Bk. No. 39-B[1] — 50 cents
If I Were 21[1]
Circular No. 21-F

Sunbeam Corp., 4433 W. Ogden Ave., Chicago 23, Ill.
Stewart Vest Pocket Heat Treating Data Book
Stewart Handbook of Heat Treating Information and Equipment for Students and Apprentices
Series of regular bulletins, "Stewart Metal Minutes"

Walker-Turner Co. Inc., Plainfield, N. J.
Machine Tools for Industry (catalog)

[1]Available in English, Spanish, and Portuguese.

Machine Tools for Metal, Wood, Plastic (catalog booklet)

Worcester Pressed Steel Co., The John Woodman Higgins Armory, 100 Barber Ave., Worcester, Mass.
Early Blast Furnace Operations
Pageant of Steel
The Industrial Museum
Industrial Museums — Their Functions and Opportunities
The Worcester Pressed Steel Museum

(To be continued)

Joseph Sandberg—1871-1947

EMERSON STAEBNER
Assistant Director of Industrial Arts
Boston, Mass.

On September 20, 1947, one of the truly great teachers of industrial arts in America passed away. Joseph Sandberg was a leader in this field for over half a century. When he retired in June, 1942, he had completed 52 years of teaching. He had trained hundreds of men, and women too, in the fine art of being able to impart knowledge to others. At the convention of the American Vocational Association in Boston, that same year (1942) he was feted as the oldest industrial-arts teacher, in point of service, in the United States.

In 1890 Gustaf Larsson, "the father of American sloyd" sent to the Normal School at Naas, Sweden, for an outstanding student to come to America to help him in his work at the Sloyd Training School in Boston. This institution, founded in 1888 by Gustaf Larsson and Mrs. Quincy Agassiz Shaw, and oldest of its kind in America, needed an additional instructor. Mr. Sandberg was chosen and took up his duties in the fall of 1890, when but 18 years of age, and continued at the Sloyd Training School and its successor, The Training School for Teachers of Mechanic Arts, until his retirement.

In the summer of 1919, Gustaf Larsson died and Joseph Sandberg became principal. In 1922, when the city of Boston assumed sponsorship and changed the school's name, Mr. Sandberg was appointed assistant director of manual arts. He continued to guide the destinies of his beloved teacher training school for 21 years more. He was always progressive, making it a point to keep up with the times and with the changing conceptions of the objectives of industrial-arts education, whether designated as sloyd, manual training, mechanic arts, or industrial arts.

Joseph Sandberg for years edited the *Sloyd Record*. He wrote articles for the old *Manual Training Magazine* and the *School Arts Magazine*. He joined the Boston Manual Training Club, now the Massachusetts Industrial Education Society, soon after its founding, and remained an active member until his death, holding many of the offices at one time or another, including that of president.

In 1930 Mr. Sandberg helped start The Sheltered Workshop, on Tyler Street, Boston. Here tubercular men and women were speeded in their recovery and given renewed confidence in themselves through the building of fine furniture. He served on the committee which sponsored the workshop for 17 years and after his retirement spent one day each week in the shops as a special consultant.

Joseph Sandberg was greeted by hundreds of his former pupils in May, 1947, when he was the guest of honor at a banquet celebrating the twenty-fifth anniversary of the Training School for Teachers of Mechanic Arts and the fifty-ninth of the Sloyd Training School.

Those of us who came under Joe Sandberg's tutelage were fortunate. We owe him a debt we can never repay. He was loved and respected by all who came in contact with him. An expert craftsman, as well as teacher, he taught by example. He believed thoroughly in the value and the mission of industrial arts.

The Training School for Teachers of Mechanic Arts is his finest memorial. This institution to which he devoted all the working years of his life, carries on, inspired by his ideals.

Problems and Projects

JARDINIERE OR COPPER DISH

HOMER C. ROSE
Tyler Park
Falls Church, Va.

The copper dish shown in Figure 1 is a useful and interesting article for the home. The suggested method of laying out a flaring vessel is more economical than the common method, and in addition, makes the project more attractive and provides greater opportunity to gain experience with tool processes.

BILL OF MATERIAL

Name	*No. of pcs.*	*Material*	*Size*
Body	1	Copper or Bronze, 28 to 20-ga.	4⅜ x 15¼
Bottom	1	Copper or Bronze, 28 to 20-ga.	3½ dia.
Rivets	20	Brass escutcheon pins	1/16 dia.

Procedure

1. Make a layout for one of the segments as shown in Figure 2.

2. Make a pattern of this segment from bright tin or 28-gauge galvanized iron. The pattern must be very accurate to facilitate the alignment of the rivet holes.

3. Trace this pattern five times on the stock as shown in Figure 3.

4. Cut the segments to exact size with sharp tin snips. Cut to the end of the snips to avoid marking the metal beyond the cut.

5. Planish all pieces with planishing hammer (not ball-peen hammer).

6. Anneal the copper by heating to a dull red. Quench in water.

7. Flatten the pieces and mark centers for holes by using the pattern and a prick punch.

8. Drill all holes. CAUTION: If drill press is used for this operation clamp the stock to a board on the drill press table.

9. Rivet segments together with heads of rivets on the outside. Protect the heads with proper rivet set held in the vise. Small brass escutcheon pins, which have been cut to proper length, may be used as rivets. The rivets should be cut short so as to flatten out well on the inside of the dish.

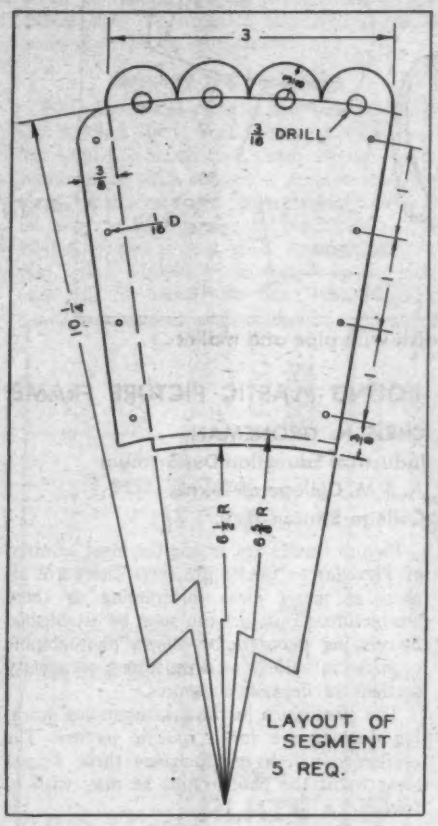

Fig. 2. Layout for segment of copper dish

10. Form the lower ⅛ in. of the dish inward to make an edge at right angle to the body of the dish. This may be done by placing the dish on a stake or on a piece of large pipe (about 3 in. O.D.) held in the vise. The edge may then be hammered over to form the ⅛-in. inside burr. See Figure 4.

11. Cut a copper disk to 3¼-in. diameter and fit it on the inside of the dish and against the burred edge.

12. Solder the bottom in place. Soldering may be done from the outside with the dish inverted over a short length of pipe to help hold the bottom in place. See Figure 5.

Fig. 1. Copper jardiniere or dish

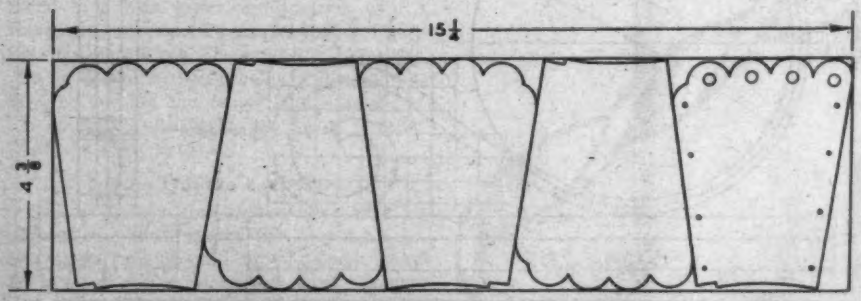

Fig. 3. Method of tracing template to save metal

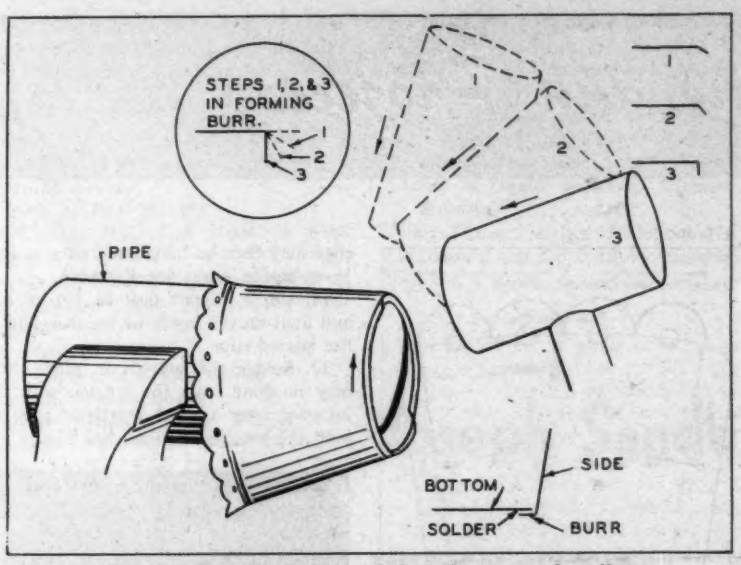

Fig. 4. Forming burr on dish with pipe and mallet

13. Polish or high light the outside surface with fine steel wool.
14. Clean the inside surface with emery cloth and steel wool.
15. Wax or lacquer with dull lacquer.

Alternatives

The dish may be designed around a glass container. Since plants will not grow well in a copper container, the inside surface should be painted or given several coats of lacquer if it is to be used for this purpose. The copper container also can be made large enough so that a potted plant can be set into it.

Lock seams could be used for the joints. This would give the project a more modern appearance.

In place of planishing, simple designs could be etched or chased on the segments.

ROUND PLASTIC PICTURE FRAME

CHRIS H. GRONEMAN
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A. & M. College of Texas
College Station, Tex.

Picture frames are among the most admired of Plexiglas or Lucite projects. There are almost as many ideas in framing as there are pictures. This fact can soon be established by visiting photography shops, photographic counters in variety or drug stores, or novelty sections in department stores.

The sizes given in the accompanying working drawing are for a specific picture. The craftsman will have to change these dimensions to fit the photographs he may wish to frame.

The round shape frame is slightly more difficult to form than most straight frames because a scroll must be made for the frame. Even though only small pieces of plastic are required for this frame, it usually sells for a higher price in stores. This shape is very distinctive and is ideal as a desk picture holder.

BILL OF MATERIAL

Quantity	*Material*	*Description*	*Dimension in inches*
1	Plastic	Base	¼ x 1½ x 6¼
1	Plastic	Frame scroll	3/16 x ⅝ x 12
2	Glass	Panes, single strength	3½ dia.
	Plastic cement		
	Plastic dye		

Procedure

1. Lay out all parts full size on Plexiglas or Lucite.
2. Cut out parts with band or circular saw.
3. Plane and file the edges.
4. Cut the groove in the frame scroll with a circular saw, to fit the glass.
5. Heat and bend the scroll frame according to full size template.

Plastic picture frame

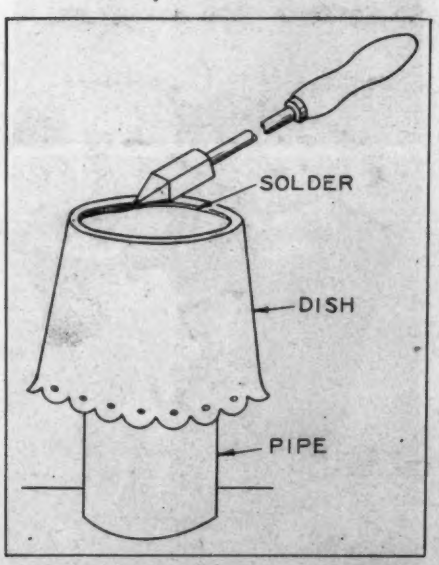
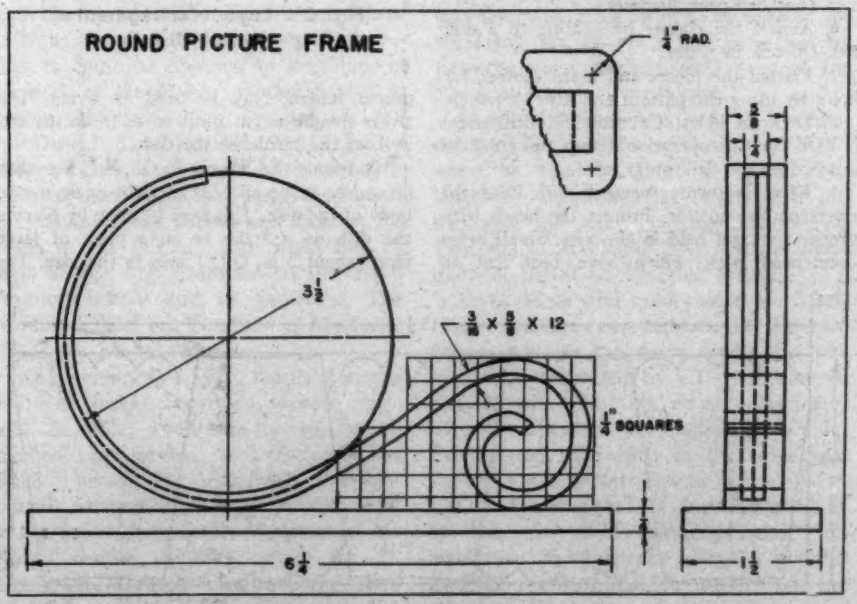


Fig. 5. Dish held on short length of pipe for soldering bottom in place



Plastic picture frame by Chris H. Groneman

6. Place the scroll in proper position on base and apply cement.
7. Tint the frame if desired.
8. Apply a coat of wax and polish with a soft cloth.

A TRAFFIC OFFICER IS NEEDED

According to the report, an officer usually is warranted at a school crossing when the following four conditions are fulfilled:

1. When adequate natural gaps in traffic for crossing on foot are not sufficiently frequent for safety.
2. When the total cost of creating adequate gaps in traffic cannot be done more economically by properly designed traffic signals, by school employees, or others deputized for this purpose.
3. When no other intersection in the community exists and is known where police control of traffic would protect children at a lower cost per child.
4. When the number of vehicles per hour in both directions on the street while it is being crossed multiplied by the number of children crossing on their way to or from school exceeds 30,000. (International Association of Chiefs of Police, 1704 Judson Ave., Evanston, Ill.)

COAT HANGER

HOWARD W. BROERE
State Teachers College
Oswego, N. Y.

The coat hanger described herein is a good introductory project for the junior high school industrial-arts shop. This cold metal project is simple, requires a short time to make, is attractive, useful, and requires a minimum of material.

Processes involved make it especially suitable as an introductory metal project. Things to be learned from its construction are laying out, cutting with the tin snips and hack saw, filing, twisting, bending, drilling, riveting, and finishing.

Originality on the part of the student can be expressed in designing the backplate to his desire. Several suggestions are included, but there are many others that can be made. Peening or planishing the backplate will change the entire appearance of the coat hanger. A combination of cross peening and planishing is also suggested. Polishing the metal to a high luster and spotting with a dowel and carborundum powder makes a very rich looking project. The band iron frame can also be altered, by ball peening, a combination of cross peening and center punch marks, or by spotting with gold or silyer powder while the paint is drying.

Laying Out the Backplate

Before making this layout it is wise to measure the thickness of the door that the coat hanger will be used on. Our doors today are in many varied thicknesses, most common sizes being 1¼ and 1⅜ in. Be sure to make allowances for the thickness you intend to use on the working drawing as the one shown in the illustration is made for a door 1¼ in. thick. Lay out the dimensions with a scriber, dividers, and steel scale on the 19-gauge black iron. Draw in the center line and mark the points, where the rivets will be, with a center punch. Also draw in the two bending lines. Cut the metal out on the scribed lines with the tin snips. Round-nose tin snips will be much handier in turning the corners of any radius. File the edges to take the sharpness away that the tin snips leave.

Bending the Backplate

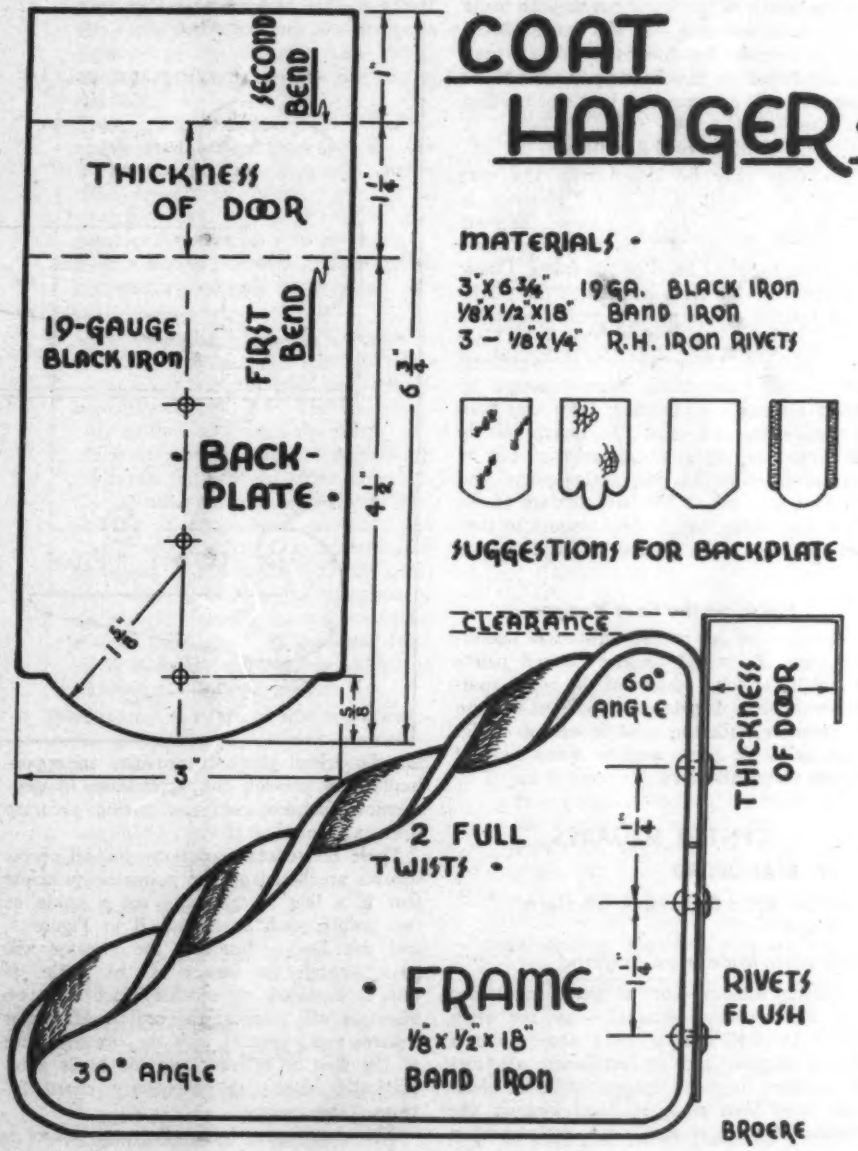
Place the metal plate in the vise along the line marked "First bend." Using a wood mallet, bend this metal to a sharp 90-deg. angle. Remove the plate and set it again in the vise along the line marked "second bend." It will be hard to find a vise to bend this a full 90-deg. angle, so just start the bend in the vise. Place a piece of hardwood in the vise that will fit under this bend, just slightly smaller than the thickness of the door. Continue to make this a sharp 90-deg. bend with a wood mallet.

Laying Out the Band Iron Frame

The frame is the piece that is perpendicular to the door. It is not necessary to have this heavier than ⅛ by ½ in. The frame requires 18 in. of this size band iron. Lay off with chalk a mark 2 in. from the end. This is the start of the twist. Make another mark 7½ in. from the first mark. This is the end of the twist. It is not necessary to lay off for the last bend as this must be done by inspection and determining the lay-off mark before assembling the coat hanger.

Twisting the Band Iron

To prevent the twists from getting out of line it should be done in a piece of pipe. Select a piece of pipe that will slide over the band iron closely. It should be 6½ to 7 in. long. Secure the band iron in the vise on the



first 2-in. layout mark. Slide the length of pipe over the band iron. Select a monkey wrench or a strong adjustable end wrench and fasten it to the band iron at the second or 7½-in. layout mark. Make two full twists or two complete revolutions with the wrench. Remove the wrench and the length of pipe and you will have a true twist.

Bending the Band Iron Frame

A piece of ¾-in. round iron will help in making the three bends of the triangular frame. The first bend is on the 2-in. layout mark, close to the twist. This is bent to about 60 deg. The second bend is at the end of the twist. If it is difficult to make this bend with the round iron, a sheet-metal stake is suggested. Laying out this last bend should be done by holding the frame against a door as it will be when completed. When the bottom of the frame is perpendicular to the door, lay off for this bend. Bending this time will complete the triangular frame. Any adjustment in length of the stock can then be made with a hack saw and file. The frame should next be checked for unwanted twist. If any has developed in the bending it should be taken out with a hammer or by slight bending in a vise.

Drilling and Riveting

The door may be closed with the coat hanger still on it if a little clearance is allowed to let the frame pass under the door molding. Take this into consideration when laying out the rivet holes on the frame. Check the layout of the rivet holes with the marks made by the center punch on the backplate before marking them. Drill these six holes with a ⅛-in. drill. Use ⅛- by ¼-in. roundhead iron rivets. Draw both pieces together by having a riveting stake under the round head of the rivets, and using the round hole in the rivet set. A portion of the rivet can be snipped off with the side cutting pliers, and the rivet set flush to the back surface of the plate. The rivets may be filed smooth so they will not scratch the surface of the door it is used on.

Finishing the Coat Hanger

The coat hanger can be finished in numerous ways. Burnt oil finishes colored paints to match the color scheme of the home, spotting with silver or gold powder blown on with an atomizer while the paint is setting, or flat black paint are a few ways to make the coat hanger more attractive.

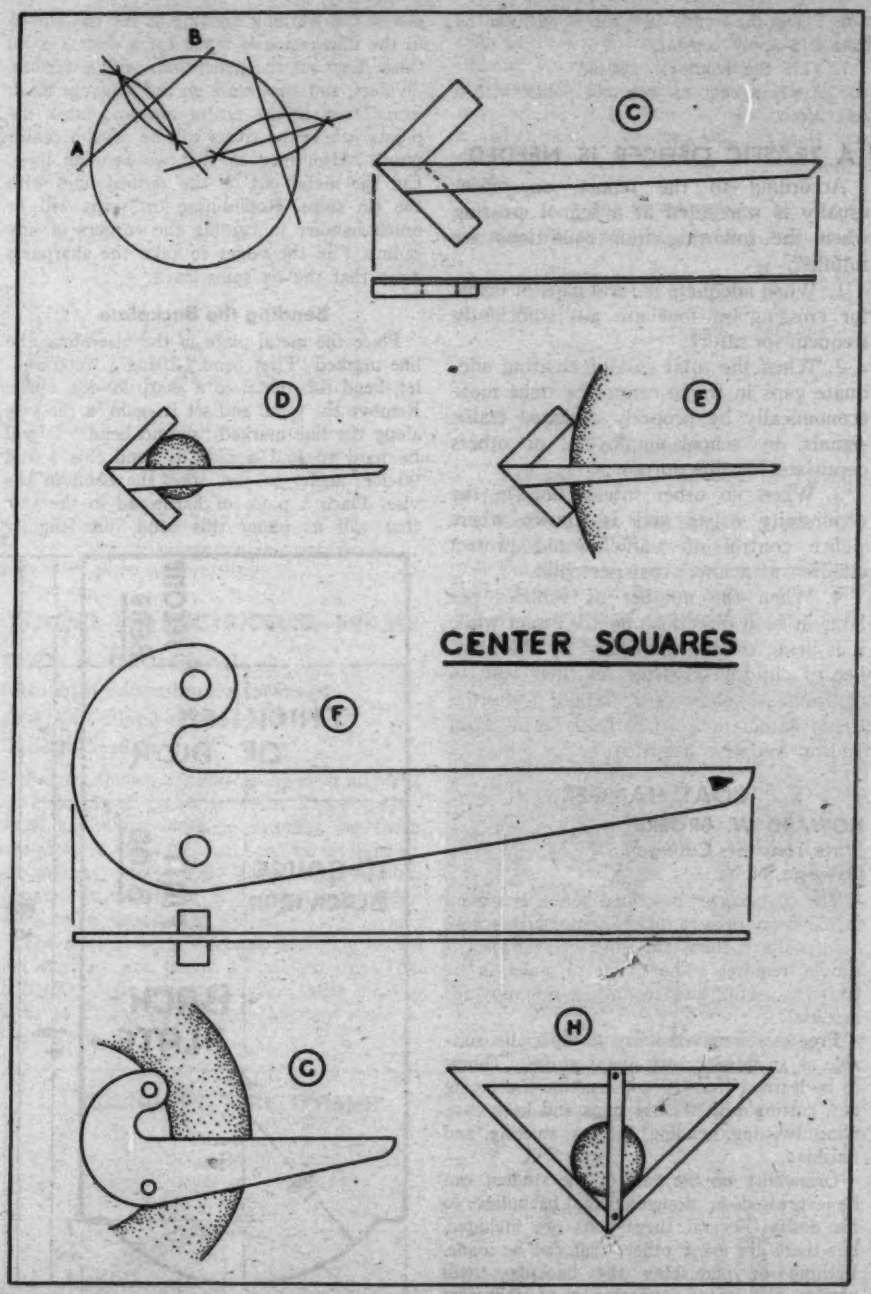
CENTER SQUARES

P. W. BLANDFORD

Gibbons Road Secondary (Modern) School

Willesden, Middlesex, England

Center squares — or as some craftsmen call them: "round squares" — are not often found in tool catalogs, yet they serve a special purpose and are invaluable at times to workers in many trades. Most of those seen have been made by their owners. The making of a center square is a useful project for the school shop. It provides an opportunity for showing the application of geometric principles and is a test in accurate workmanship.



There are several variations, but all center squares are based on the geometric principle that if a line is drawn to cut a circle at two points, such as *A* and *B* in Figure 1, and this line is bisected, the bisector will pass through the center of the circle. If this is repeated at another place the two bisectors will cross at the center. All center squares make contact with the circumference of the disk or cylinder and the blade automatically bisects the imaginary chord between these points.

The commonest form of center square is found in the center head on a machinist's combination square. A fixed square may be made in a similar form, as shown at *C* in Figure 1. This consists of a right-angled block with two equal arms and a blade having its edge bisecting the angle. When centering small objects the sides of the block rest against the circumference, as at *D*, Figure 1. On bigger circles the points of the block make contact, as at *E*.

For metalwork a suitable size is a block 2 in. by 2 in. about 1/4 in. thick, with a blade 6 in. long and 1/16 in. thick. This could be made of mild steel, or tool steel. To secure the blade a bed for it might be cut in the block with the miller or a shaper and the joint fastened with two countersunk

machine screws. The tool looks good if the surface is polished brightly.

For woodwork the block should be of close-grained hardwood and the blade of ash or hickory. The bearing corners of the block should be shaped with equal small radii, to minimize wear. The block should be 1/2 by 4 by 4 in., and the blade 3/8 by 10 in., tapered to a thin edge. The blade should be glued and screwed into a shallow groove in the block.

The type shown at *F* consists of a flat plate with two pins; the edge of the blade being at right angles to and bisecting the line between the pins. This cannot be used on circles of less diameter than the distance between the pins, but it is convenient for drawing lines at right angles to internal curves, and if the pins project at both sides it may be used with either side up. This form seems to be favored by workers on large curves, such as are found in bridge and roof work.

One specimen that was examined was made of gun metal 1/8 in. thick and 14 in. long. It had been used for about 200 years in a village wheelwright's shop. Made of plywood with short hardwood dowels, this is a useful tool in a carpenter's shop.

The last pattern, *H*, consists of a triangular frame in the form of an equilateral right-angled triangle with a blade fixed so as to join the center of the hypotenuse with the right angle. Its use is limited to circles small enough to fit within the frame. This restricts its application, but it is favored by wood turners who are only concerned with centering small stock.

It is generally made of hardwood; the three sides being joined by halving or bridle joints, and the blade screwed on.

AERONAUTICS

WILLIAM E. NAGEL
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Wichita, Kans.

(Continued from page 431 of the December, 1947, issue)

UNIT VII

Airplane Instruments

Word list for unit on airplane instruments:

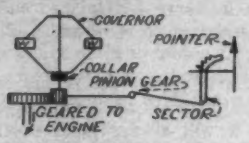
1. thermocouple	13. air-speed indicator
2. tachometer	14. diaphragm
3. Bourdon tube	15. pitot tube
4. voltmeter	16. static tube
5. manifold	17. dynamic pressure
6. aneroid	18. static pressure
7. synchroscope	19. lubber line
8. hydrostatic	20. capillary
9. indicated air speed	21. precession
10. pressure altitude	22. gimbal
11. stalling speed	23. Northernly turning error
12. wind drift	

I. Engine instruments

A. Tachometer — an instrument to indicate the speed of rotation of the engine crankshaft in revolutions per minute.

1. Three basic types:

a) Mechanical or centrifugal tachometer



Mechanical or centrifugal tachometer

b) Magnetic tachometer

c) Electric tachometer

B. Temperature gauges

1. Temperature of engine oil — by vapor pressure type gauge usually. A capillary tube and bulb (212 F. maximum) working on the Bourdon tube principle.

Temperature gauge

(Where temperature of bulb is raised, the vapor inside expands and creates a pressure in the Bourdon tube which tends to straighten the tube and rotates the bulb.)

2. Engine cylinder temperature — thermocouple thermometer type (600 F.). An instrument of two dissimilar metals when brought into contact produce an electrical potential — a change in temperature is measured by a voltmeter.
3. Engine cooling liquid temperature gauge.
4. Carburetor intake air temperature.

C. Pressure gauges

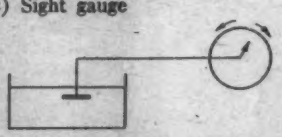
1. Oil pressure indicates the pressure in pounds per square inch that the lubricating oil is being supplied to the moving parts of the engine. The same principle as the vapor pressure gauge.
2. Manifold pressure gauge — supercharging forces the fuel and air mixture into the cylinders in greater volume than possible at atmospheric pressure. The density of the mixture can be measured by means of the intake manifold pressure which works on the principle of the aneroid altimeter (uses a two-celled aneroid diaphragm). It measures from 10–50 inches of mercury when thirty is standard atmospheric pressure.

D. Synchroscope is a type of electric tachometer to synchronize the engines on multi-engine planes so that they will operate at the same speed. The left engine is standard on the plane. The speed of the engine is controlled by the throttle.

E. Fuel quantity gauge

1. Three types of gauges

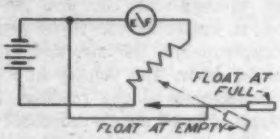
a) Sight gauge



Sight fuel gauge

b) Hydrostatic gauge—the pressure exerted by the volume of a liquid is proportional to its depth.

c) Electric liquidometer — variable resistance (rheostat in the electric circuit, usually one used).



Electric fuel gauge

F. Exhaust gas analyzer — uses a Cambridge aero mixture indicator which analyzes the exhaust gas and records the analysis on an indicator calibrated to read from 0.11 to 0.066 which indicates the percentage of fuel in the fuel and air mixture (by weight). It is used in conjunction with the manifold pressure gauge to determine the best mixture.

G. Remote indicating instruments — consist of two electric motors so connected that if one motor is turned to a new position the second motor will undergo a similar position. This eliminates long shafts and tubings by substituting light electric wire.

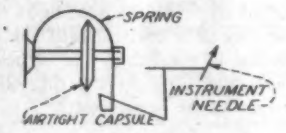
II. Navigation of flight instruments

A. Compass is a magnetized needle balanced and free to point toward magnetic north. On airplanes the scale is on a cylindrical card which turns with the needle. To offset other effects compensating magnets are used to correct deviations in the compass needle.

N	33	30	W	24	21	S	15	12	E	6	3	N
360°	330°	300°	270°	240°	210°	180°	150°	120°	90°	60°	30°	0°

B. Altimeters

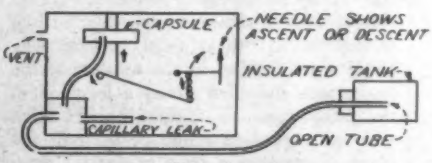
1. Ordinary altimeter — position of the pointer is fixed for a given measure and the thumbscrew rotates the scale. There is no barometric reading on this altimeter.



Altimeter

2. Sensitive altimeter depends upon the differences in pressure to measure the altitude. Remember it does not necessarily show the height above the ground. It is safest to register the height above sea level. The scale is fixed and the hands are adjustable on this type of altimeter.

C. A rate of climb indicator operates on the principle of the aneroid barometer and is really showing the changes in atmospheric



Rate of climb indicator

pressure. The rate of ascent or descent is indicated and not the angle of climb.

D. Air-speed indicator indicates only the speed through the air, not the ground speed. It measures the force with which the airplane hits the air, and is read in miles per hour. The density of air affects the correctness of the readings. The instrument is based on the difference of pressure of still air and the increased air pressure produced by the forward motion of the plane.

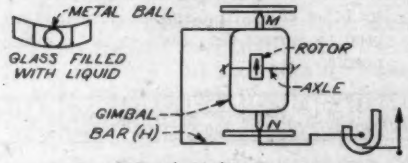
Air-speed indicator

E. Timepieces and their use

1. Clocks are used in conjunction with the air-speed indicator to determine the distance made good along the course of a track.

F. Turn and bank indicators

1. Really two instruments — the turn indicator and the bank indicator. Centrifugal force tends to keep the metal ball in position if the plane is banked correctly (bank indicator).



Bank indicator

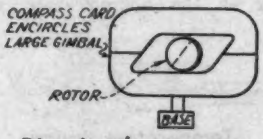
G. Drift indicators

1. Drift sight usually is installed in the floor of the plane. It consists of a piece of glass or lens with parallel lines etched on it. As the pilot looks through the lens it is rotated until the ground motion is parallel to the etched lines. From the scale on the ring the drift angle can be read directly.

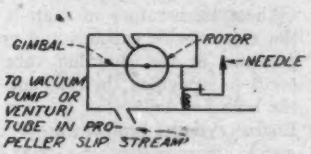
Drift indicator

H. Artificial horizon is sometimes called the gyro horizon. It makes use of the directional inertia of the gyroscope (12,000 r.p.m. for its rotor). By the diagram for the turn and bank indicator XY is always vertical and MN is always horizontal. Bar H is permanently attached to the gimbal and is shown in the face of the instrument as the artificial horizon. The airplane is mounted in the window of the instrument and then shows a level, pitch up, pitch down, or a right or left bank with corresponding action of the real airplane. Sometimes a scale in degrees similar to the compass is placed on a ring of the instrument to show angle of bank and pitch.

I. Directional gyroscope is an instrument used in place of the compass. When set north it will always point north. It has a lubber line and a scale the same as a compass. It needs to be reset occasionally in flight by the magnetic compass due to error caused by friction. Advantages for it are that it is not subject to northernly turning error and does not oscillate which makes it especially valuable in making turns.



Directional gyroscope



Turn indicator

J. Automatic pilot is a combination instrument of artificial horizon indicator and the directional gyroscope made so as to control the ailerons, elevators, and the rudder of the plane. Will return the plane to any course.

(To be continued)

HANDY FINISHING CABINET

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Some of the more important objections heard concerning the average facilities for storing finishing brushes, are:

1. The amount of time wasted in cleaning brushes properly and the consequent neglect by carelessness.
2. The ruined brushes caused by misuse and failure to clean or store properly.
3. The difficulty involved in keeping enough containers on hand for painting and for the cleaning of brushes; also the unsightly habit of leaving dirty containers in the storage cabinets and the difficulty of disposing of them.
4. The recurrent inquiries from students as to proper solvent or thinner, or the correct liquid to use and the procedure steps in applying the finish.
5. The amount of wasted turpentine and other solvents.

These objections were largely overcome by using the finishing cabinet shown in the accompanying illustrations. This cabinet has the following features.

1. The brushes are kept suspended off the bottom of the container by use of a screw eye set into the handles of the brushes so that the brush may be hung on a nail or pointed rod protruding out into the compartment.
2. The brushes most commonly used need not be cleaned but are suspended in a solvent. Only the paint brushes need to be worked in

Finishing cabinet

the solvent when the color of paint or enamel is changed. Varnish and shellac brushes are used without cleaning for they are suspended in a thinned solution of the proper liquid. One compartment has no solvent. Brushes are put in that compartment already cleaned that they may drip.

3. Paper cups make excellent containers for holding small amounts of the desired finishing liquid. The paper cups are discarded after they have been used once. The school lunch counter may often provide used paper cups worth salvaging for this purpose.

4. The outside of the lid has a glass cover which protects the typewritten instructions which refer to the particular compartment beneath and the use of the brushes it contains. The instructions cover the procedure for applying that particular type of finishing liquid. The correct solvent or thinner and the color code corresponding to the color of the handles on the brushes are to be kept in that compartment. The walls of the compartment are also the same color making it almost impossible for one to get the brushes in the wrong compartment. These written formulas and procedures were taken from Hjorth's *Basic Woodworking Processes.**

Some additional features incorporated in this cabinet that have been found desirable, include:

1. An extra compartment for storing rags, strainers, paper cups, stirring paddles, and miscellaneous supplies. Additional compartments may be added to increase the value of the cabinet especially in those shops having no special finishing room.

2. The cabinet has handles, so that it may be carried about easily.

3. It is made of 18-gauge sheet iron, or galvanized iron.

4. Rigid supports for the paper cups on the side are made of welding rod in the form of a split ring permitting expansion to fit various size cups. A piece of band iron supports the weight of the cup.

5. The compartments which hold the solvents are made from varnish cans with the tops cut off. They may be removed for cleaning or replacement.

How to Build the Finishing Cabinet

This particular cabinet was made to take varnish cans of uniform size but many other types of square cornered cans may be used. Make sure that you have enough and that all are the same size before establishing the size of the cabinet. Sheet iron should be used, in order to provide safety against fire hazards. The sheet iron was cut large enough to permit a flange at each corner for fusion welding and a flange around the top for strength and to provide a seat for the lid. The lid may be hinged on although this one was made in two parts which merely set on the opening, with a hook bent on the top or back edge to catch the flange. This lid may be lifted off or slid off one end at a time. The hinge would probably be better and can be welded on. The handles are made of wood or band iron — the band iron can be welded on. The glass cover on the lid is held in place by a strip of sheet iron which is bent into a *U* shape the long way. Solder a piece on each edge of the lid leaving the end open to slide the glass and paper in. The lid has wood handles fastened with screws from beneath. The brushes are supported on pieces of 1/4-in. rod cut and threaded about 3/4 in. to permit a nut on the outside and one on the inside of the cabinet for supporting the rods. This makes them removable in case the cans are to be removed. The compartments are separated by wood which may be planed thinner for a better fit.

The exact dimensions will vary with the size of the cans used, the material used, and the number of compartments included. The one shown was made about 12 in. high in the back and about 7 in. in the front. The reason for the slant is obvious. The length was enough to allow for the right number of cans and separators plus the amount for the flanges at the corners (about 3/8 of an inch).

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DEVICES THAT AID IN SHOP MANAGEMENT

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The busy shop instructor is confronted with many problems of management that makes demands upon his time and energy. The following devices have been found by the writer to pay dividends when employed in the shop.

1. *A Project Plan Sheet.* A sample of this is shown in Figure 1. This may be a mimeographed form or it may be a printed form. Every student in the writer's shop is required to draw up a plan sheet when he starts a project before stock is issued. This plan must be approved by the instructor. The plan sheets are kept in folders in the shop so that both student and instructor may refer to them if and when the need arises. The values of this device are:

a) It is a written record of the student's participation and progress in the shop.

b) It requires every student to do some thinking and planning of his own.

c) It aids student and instructor in estimating costs.

d) It aids instructor in anticipating necessary supplies.

e) It helps eliminate waste.

2. *Printed Instruction Cards on Machines.* A sample card for use on the shaper is shown in Figure 2. Such an instruction card, with a limited number of the most salient instructions briefly stated, printed in large bold type and posted on the machine is an ever constant reminder to the operator and sometimes it is a fair substitute for the busy instructor himself. Recognition of the card must be accomplished early in the school year by the instructor explaining the purpose of the card and the instructions printed thereon. The posted card alone will not get the desired results.

3. *The Kardex Card File,* shown in Figure 3, is used for keeping the financial records of each student. A sample card is shown in Figure 4. The card must be a simple one; otherwise it becomes a burden to the instructor to keep it posted. In addition to the per-

INSTRUCTION FOR USING SHAPER

1. Request approval of instructor.
2. Set up machine with proper cutters and proper size cut.
3. Make trial cut on scrap.
4. Readjust if necessary.
5. Proceed with work.
6. Cautions:
   a) Check to see if cutters are tightened securely before starting motor.
   b) Keep both hands away from cutter head while machine is running.
   c) Remove or tie any loose clothing before attempting to use shaper.
   d) If anything goes wrong, turn off motor at once and notify instructor.
   e) Use guard whenever possible.

Fig. 2. Instruction sheet for the shaper. Original size, 8 by 7 in.

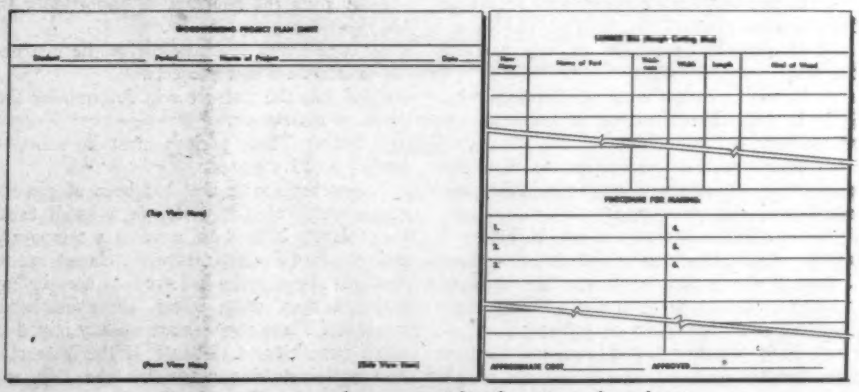

Fig. 1. Front and reverse side of project plan sheet. Original size 8½ by 11 in.

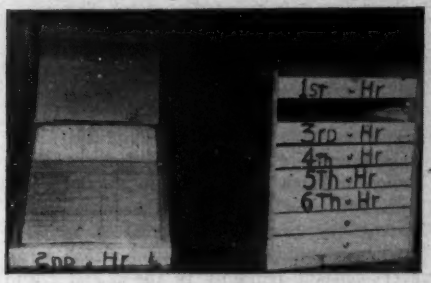

Fig. 3. Card index file

sonal information the card should show names of all projects, total cost of each project, and payments made by student. The cards are arranged in the file in the same alphabetical order that the students' names appear on the instructor's class rolls. The cards must be made up at the beginning of the school year. They require daily posting from the cash receipt book and the project plan sheets. The file shown in Figure 3 is shop made. The pockets were purchased at a local office store, and the cards were printed in a high school printing class.

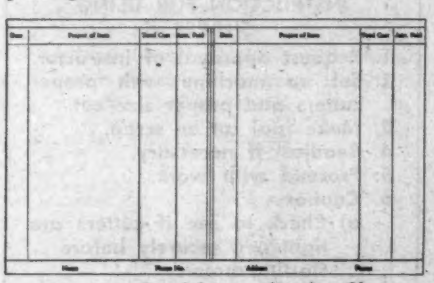

Fig. 4. Card for card index file. Original size 5 by 8 in.

4. *Numbering of workbenches and machines.* Figure 5 shows that all bencches in the author's shop are numbered. Beginning with number one and numbering upward consecutively, the benches and machines are numbered with large red numbers painted on a white background. The students are assigned to the benches in the same order that their names appear on the instructor's alphabetized class rolls. The values of this device have been found to be:

a) It provides each student with a regular definite work station.

b) It relieves congestion in any part of the shop.

c) It facilitates the handling of large classes.

d) It aids the instructor in centering responsibility.

e) This scheme of numbering machines applies only where there are more than one machine of the same type.

5. *Labels.* The samples shown in Figure 6 were made in the high school drafting class. Figure 7 shows the labels on the doors of storage locker cabinets in the author's shop. The values of labels are as follows:

a) They identify liquid contents kept in cans quickly.

b) They locate tools and supplies kept in drawers and cabinets quickly.

Fig. 5. The shop benches are all numbered

ORANGE SHELLAC

LACQUER SEALER

CLEAR LACQUER

KEROSENE

CUP CLEANER

Fig. 6. Labels. Height of letters — ⅝ in.

c) They locate and identify students' projects belonging to different classes quickly. (The writer has six classes averaging 33 students to the class. Twelve large lockers with labels on the doors, part of which are shown in Figure 7, help to keep the unassembled projects of each class in order. The door of one cabinet was removed when the photograph was taken so that the contents would be shown.)

6. *A short lecture, explanation, or demonstration period at the beginning of every class period.* This accomplishes the following:

a) It gets the class into the proper attitude and frame of mind to do woodwork.

b) It provides opportunity to supply needed information to the class as a group.

c) It gives the students an opportunity to ask questions.

d) It provides opportunity for the instructor to introduce new projects.

e) It aids the instructor in determining the needs of his classes.

f) NOTE: These periods must be short — from 5 to 15 minutes.

7. Another device that has been of considerable value to the writer is a small table conveniently located to serve as a temporary storage place for supplies while classes are in session. The supplies referred to are shellac, stains, screws, nails, fillers, abrasives, hardware, etc. These supplies are usually issued in small quantities to students. If the instructor will anticipate his needs for the day and supply such a table with a sufficient quantity of each article for one day's run, it will save

Fig. 7. Storage cabinets are all labeled

him many steps and much time. This table must be cleared at the close of the school day every day or it will become an unsightly catchall.

8. Other devices such as blueprints, charts, sketches, pictures, books, magazines, catalogs, etc., all have obvious values but are not discussed in this article.

ELECTRICAL INSTALLATION AND PRACTICE — AN INSTRUCTION SHEET

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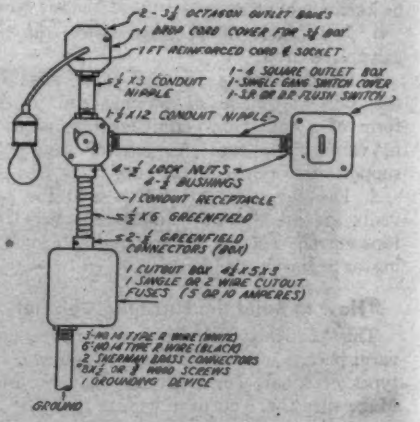
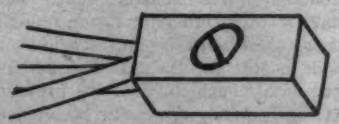
New York City, N. Y.

Object: To provide practice in conduit construction and the use of solderless splicing devices.


2 - 3½ OCTAGON OUTLET BOXES
1 BROD CORD COVER FOR ½ BOX
1 FT REINFORCED CORD & SOCKET
½ X 3 CONDUIT NIPPLE
1 - 4 SQUARE OUTLET BOX
1 - SINGLE GANG SWITCH COVER
1 - S.P. OR D.P. FLUSH SWITCH
½ X 12 CONDUIT NIPPLE
4 - ½ LOCK NUTS
4 - ½ BUSHINGS
1 CONDUIT RECEPTACLE
½ X 6 GREENFIELD
2 - ½ GREENFIELD CONNECTORS (90°)
1 CUTOUT BOX 4½ X 5 X 3
1 SINGLE OR 2 WIRE CUTOUT
FUSES (5 OR 10 AMPERES)
3 - NO 14 TYPE R WIRE (WHITE)
6 - NO 14 TYPE R WIRE (BLACK)
2 SHERMAN BRASS CONNECTORS
8 - 3/4 OR 1" WOOD SCREWS
1 GROUNDING DEVICE
GROUND

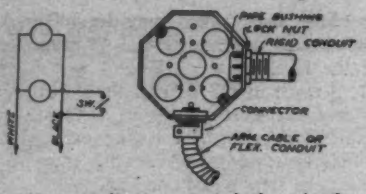
Tools: Cutting pliers, knife, 4-in. screw driver, hack saw.

Trade terms: Ream, Sherman connectors.

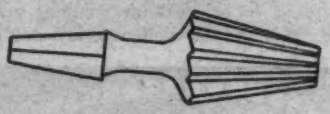


Sherman connector. This type of connector requires no taping

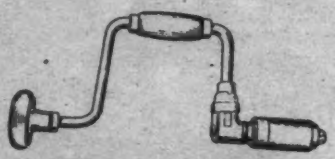
Job: Dismantle this job. Note that the rigid conduit ends are *reamed.* Reconstruct the work, making sure that the switch will control the receptacle only and that the



Wiring diagram and detail of conduit connections to outlet box



Pipe reamer



Brace for use with pipe reamer

pendant remains *hot*. Insert lamp in C.O. for test. If *clear*, insert fuse in place of lamp and put in operation.

Questions:

1. Why are splices within the conduit not permitted?
2. Name, by type letters, all the different kinds of wire that may be used in conduit work.
3. How many *outlets* on this job?
4. Why should the ends of conduit be reamed?

Reference: National Electric Code.

INDIAN SILVERSMITHING

BEN HUNT
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(*Continued from page 427 of the December, 1947, issue*)

Bracelets

The bracelets described herein represent work that is larger and more complicated than most of the projects described before. They can be made as delicate as fancy rings or they may be made as big as the massive bracelets seen in the Southwest, where the men wear them as well as the women. Figures 1 and 2 present quite a variety to choose from. The one at the top was made by a Zuni silversmith. The small, deep blue turquois, which adorn it, show it to be typically Zuni. In Plate 14 are shown detailed drawings of all six of these bracelets. The Zuni work is usually set with many small stones as may also be seen in Figures 3 and 4 on page 344 of the October, 1947, issue. The small stones are easily and quickly ground and polished and are not as expensive as the larger ones.

The second bracelet also was made by an Indian silversmith. The third bracelet is made of square wire for the base and was made by a Navaho. The stones are very fine but crudely cut and polished. This is a very simple bracelet to make.

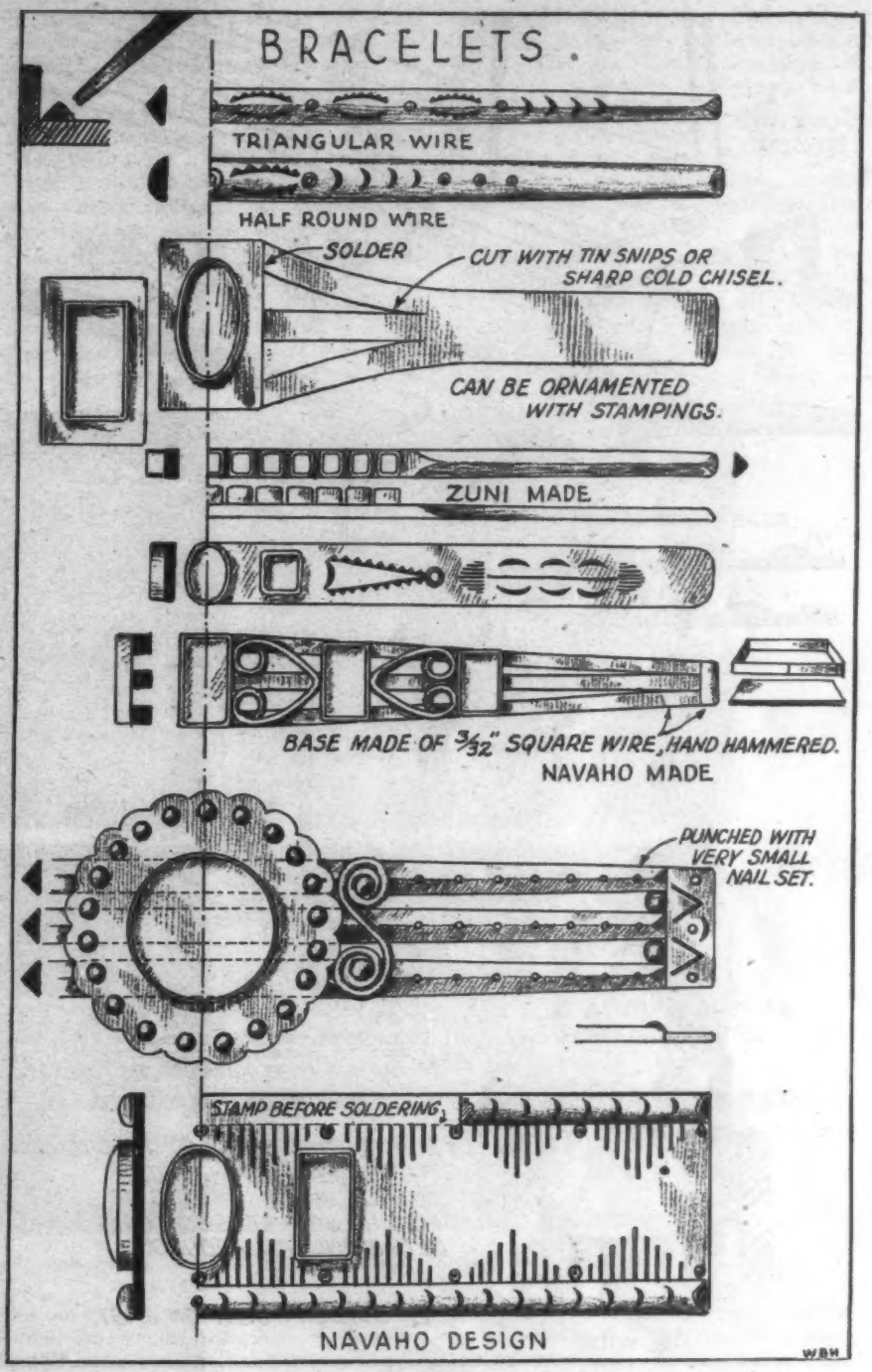


Plate 14

Number four was made by the author for his daughter some years ago. The triangular wire, used as the base, was hammered to that shape from round wire in a *V* groove filed in a piece of rail as shown in Figure 1, on page 29 of the January, 1947, issue. All of the pieces were soldered together at one time. The fifth and sixth were made expressly for this article. Number five presents the problem of soldering the half round to the band. See Figure 3. The straight lines were stamped in first. Then the half rounds were soldered at the same time as the bezels.

This presents a problem, however, as the bezels are of very thin metal, and the half rounds are quite heavy. This means that in the soldering, special attention must be given to the bezels, so that they do not melt. These large bracelets are best soldered on a screen frame so that the heat can be applied from top, bottom, and edges. The stones were set after the bracelet was polished, burnished,

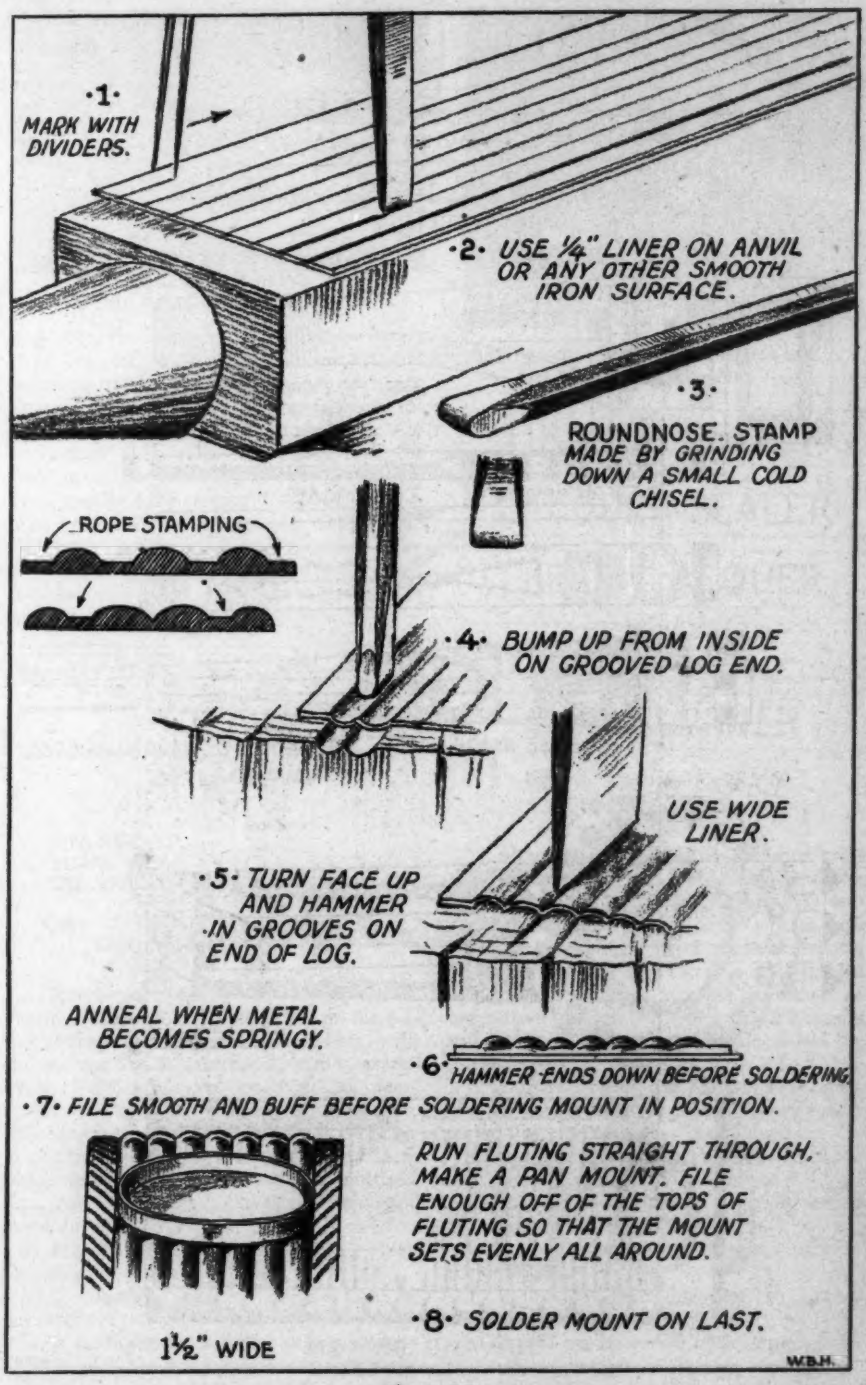

·1· MARK WITH DIVIDERS.
·2· USE ¼" LINER ON ANVIL OR ANY OTHER SMOOTH IRON SURFACE.
·3·
ROUNDNOSE. STAMP MADE BY GRINDING DOWN A SMALL COLD CHISEL.
ROPE STAMPING
·4· BUMP UP FROM INSIDE ON GROOVED LOG END.
USE WIDE LINER.
·5· TURN FACE UP AND HAMMER IN GROOVES ON END OF LOG.
ANNEAL WHEN METAL BECOMES SPRINGY.
·6· HAMMER ENDS DOWN BEFORE SOLDERING.
·7· FILE SMOOTH AND BUFF BEFORE SOLDERING MOUNT IN POSITION.
RUN FLUTING STRAIGHT THROUGH. MAKE A PAN MOUNT. FILE ENOUGH OFF OF THE TOPS OF FLUTING SO THAT THE MOUNT SETS EVENLY ALL AROUND.
·8· SOLDER MOUNT ON LAST.
1½" WIDE
W.B.H.

Plate 15

and high-lighted. In soldering the chances are that the solder will not melt and flow just as wanted the first time. By working fast, these unsoldered places may be quickly coated with flux, a few snippets of solder placed where needed, and then the heat applied with care to finish the entire soldering job. However, it may not be noticed that the soldering has been done incorrectly until the piece has been cleaned up in the pickle bath. In that case, wash it carefully and thoroughly in clean water, dry it, and then put flux and solder on and finish up.

The sixth bracelet shown in Figure 1, is very typical of Navaho work, and is beautiful even without the turquoise setting, which was added by the author. The Navahos usually make these bracelets of very thick metal, and apply a variety of flutings and stampings, mostly of the rope pattern. Indians form the bracelets by hammering and filing, but that is a laborious job. Plate 15 shows the procedure steps which may be followed in making such a bracelet. Use 18-gauge silver for the face.

1. Scratch in the parallel lines with heavy dividers, laying the blank on a smooth piece of metal or glass and letting one point of the dividers ride alongside the edge of the silver. See step 1 in Plate 15.

2. Follow these scratched lines with a ¼-in. lining tool, described in step 2, Plate 15.

3. Make the roundnose stamp shown at 3 in Plate 15 to be used for bumping up the fluting. This can be made quickly out of a

Fig. 1. Bracelets of various designs

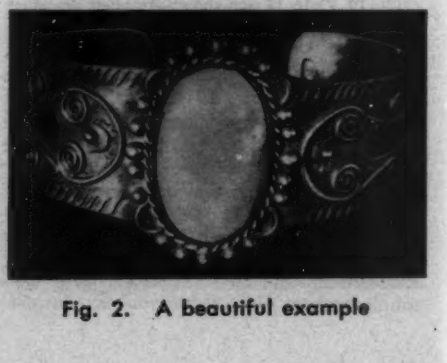


Fig. 2. A beautiful example

Fig. 3. Tapping down bezel with light wooden mallet and square-faced tool

pound down the lines, using the end of log or hardwood block to pound on. Repeat this process until the blank looks fairly even and then anneal it.

6. After the blank has been annealed, tap it flat with a rawhide or leather faced mallet. Then bend it in a shallow arc until the center is about ½ in. higher than the ends. Next take a triangular file (a small one preferably) and begin by filing down in the groove, until the small bumps disappear. Then take a flat file with a fine cut and keep on filing until the fluting is nice and even. This method of filing fluting was shown in Figure 5 on page 299, in the September, 1947, issue. Flatten out the blank again, after which the edge can be stamped on, and then the blank is ready for soldering on the back. The reason for this is twofold. The bracelet would look skimpy, made of just one thickness of metal, and the back or inside of the bracelet would look rather rough and unfinished.

Cut a piece of 18 or 20-gauge silver the same size as the face, anneal it if it is springy, and see that both face and back fit together snugly even if a bit of filing on the bottom of the fluted piece has to be done. There are two methods of soldering. One is to place the solder snippets between the two pieces, wire the whole together and solder. The other is to cut the lower piece about 1/16 in. larger all around and placing the solder snippets on this projecting edge. The latter method may be found handiest. Put flux along the edges of both pieces for a width of about ¼ in., and wire the pieces spirally along the entire length, with soft iron wire. The solder snippets are placed along the projecting lower piece after the wiring is on. Then place the whole thing on a screen soldering frame (Plate 10, p. 299, September, 1947), and apply the heat. Play the flame over and under the entire piece, and when the solder melts follow it along the edges. Wherever it does not flow right, place on more flux and solder and keep right at it. It should be mentioned also that the ends should be hammered down to a close fit before soldering. When the entire job has been cleaned, buff it and then the bracelet is ready to be shaped.

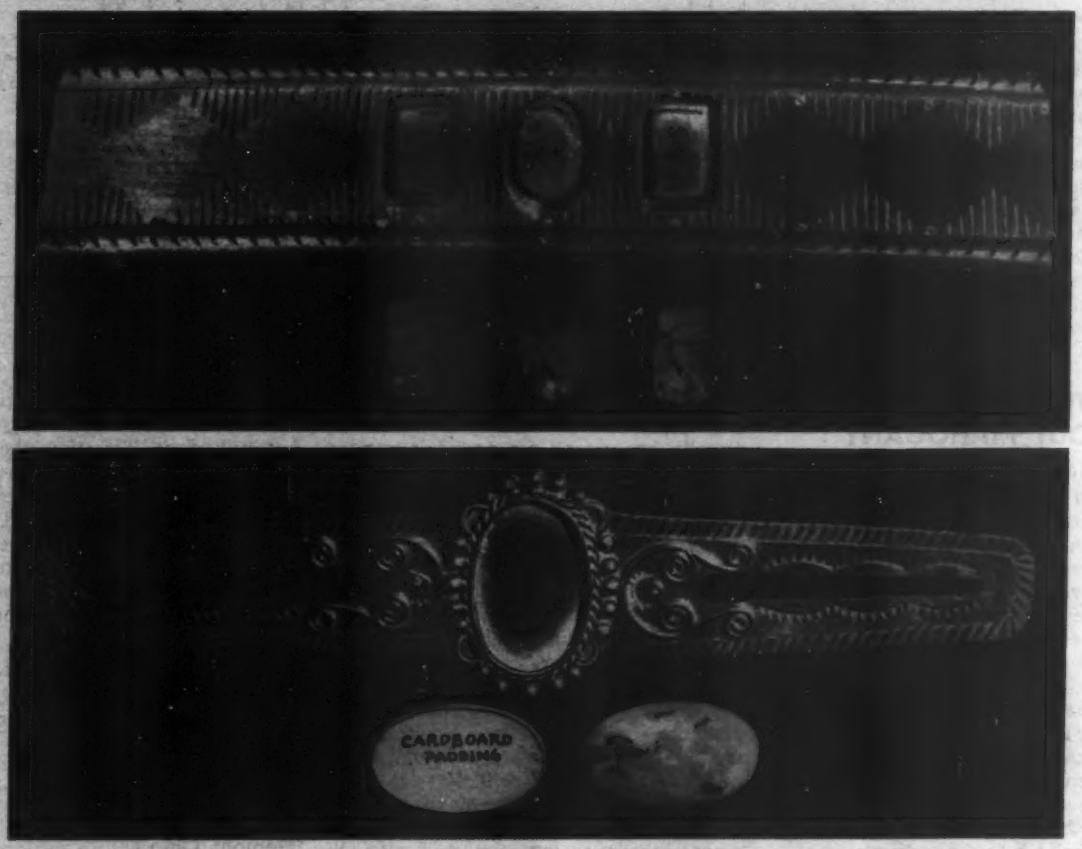


Fig. 4. Bank cleaned with pickle and powdered pumice – ready for buffing

small cold chisel which will need no extra tempering.

4. Next cut two shallow grooves in the end of a log or a block of hardwood. These may be cut in with a handsaw, and should be the same distance apart as the lines scratched into the silver. With the roundnose stamp made in step 3, round out a groove between the two grooves cut with the handsaw. Then turn the metal face down, as shown at 4, Plate 15, and hammer or bump up the ridges. Use a fairly heavy hammer for this as it saves time.

5. The grooves will look rather bumpy at first, but after they have been formed, turn the blank over and with a wide lining tool

Shaping or forming should be done before the stones are set, especially when large stones are used, as there is danger of the stones breaking in the bending process.

Bend bracelets over the horn of the anvil or a rounded piece of hardwood held in the vise. When large stones are used, the top of the bracelet is left flat for an inch or more so as not to bend the setting. Bending will not alter small settings such as those shown in all but the fourth and sixth, but to play safe, set the stones after forming.

Figure 3 shows how stones can be set, by

using a square or oblong faced punch and tapping very lightly with a small wooden mallet, while the piece is clamped in a vise. Notice the pieces of blotter on either side of the bracelet to prevent the jaws of the vise from marring the edges.

Figure 4 shows another bracelet that can be made of 18-gauge silver. This bracelet was made to match a ring the setting of which was identical to the setting on the bracelet though somewhat smaller. Figure 4 shows this bracelet in the flat, and to exact size so no drawing is needed for it.

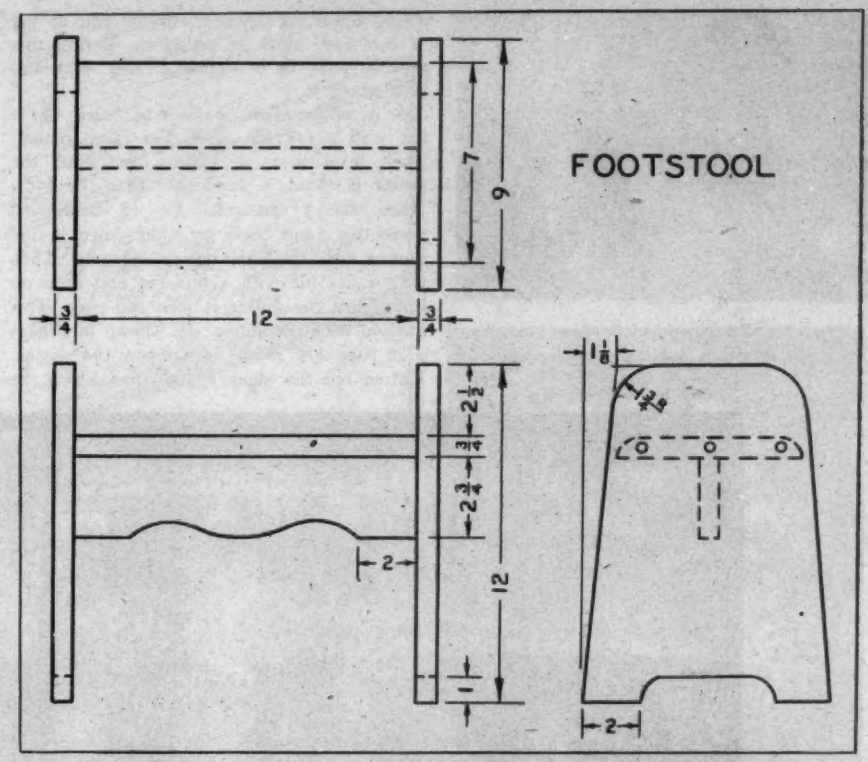
FOOTSTOOL

GEORGE BRITTAIN
High School
Johnson City, N. Y.

While the shortage of wood is still critical, the simple footstool shown may help to lighten the burden of *project finding* for the industrial-arts teacher.

Easy to make, assemble, paint and trim, along with simple layout method employed, this is well suited for the seventh-, eighth-, and ninth-grade level.

This project will delight the young craftsman as to its take-home value and use. The cost is neligible, as all parts can be made from the center piece and ends of the common orange crate.



INTERESTING ITEMS ABOUT MAHOGANY

Mahogany seeds imported from Africa and planted in southern Florida are outgrowing native pine trees at such a rate that a botanist predicts general use of this tropical tree for reforestation in this area. In its native habitat this particular mahogany tree grows to a height of 150 feet and reaches 6 to 9 feet in diameter.

Although all mahogany is imported from the tropics, the various kinds are named to indicate their specific source, as Cuban mahogany, Honduras mahogany, Mexican mahogany, Amazon mahogany, African mahogany, Peruvian mahogany, etc. So-called *Philippine mahogany*, however, is not a genuine mahogany as it comes from trees in no way related to the mahogany tree.

The choice of mahogany during the war, for planes and fast boats like the famous PT's. to a great degree was due to its unusual resistance to insects and organisms of decay, an important consideration for a wood to be used in water and in the tropics. These characteristics help to make mahogany the ideal cabinet wood.

The plywoods being used today in planes and pleasure boats are a direct descendant of the laminated woods used in ancient Egypt. To make them, numerous thin sheets of the wood, the grain of each sheet running at right angles to that of the sheets on either side, are bonded together with synthetic resin glues under heat and pressure. Because of its comparatively light weight and unusual strength, mahogany is a preferred wood for such uses. Such mahogany plywood in certain important uses, actually has, pound for pound, a greater strength than steel.

Because of its high resistance to warping, its great durability and ease of carving, mahogany is in demand today for patterns for castings of steel and iron. Many of the remaining expert carvers in this country are engaged in this work.

One of the earliest examples of mahogany furniture that was as useful as it was beautiful is the drum-type table with small drawers all around. Here, two centuries ago, the squires of Merry England conducted business with the tenants whose labor and rent were their support. Each tenant was assigned a drawer for the safekeeping of his papers and his money. And, since each drawer was equipped with two locks, much as your safety deposit box at the bank is today, with the squire in possession of one key, the tenant the other, the chances are, this table performed its duties well.

One of the strangest tales of submarine warfare on the Atlantic concerns the American tanker which was twice torpedoed, twice given up for lost and abandoned, but which eventually reached home again, patched with mahogany! The first hit pierced her forward tanks and demolished her bridge. The crew took to life boats but the damage was not fatal. The crew boarded her again and got up steam. Another torpedo flooded the tanks completely and again sent the crew overboard. Next morning, as it grew lighter, what seemed at first a rescue ship turned out to be only their own tanker, listing heavily but still afloat. This time the crew made Africa. Africa long has been a most important source of richly figured mahogany. So there was plenty on hand for repairs. Its torn hull patched with this precious wood, the old tanker once more set out and eventually reached its home port in America, safe if not exactly sound!

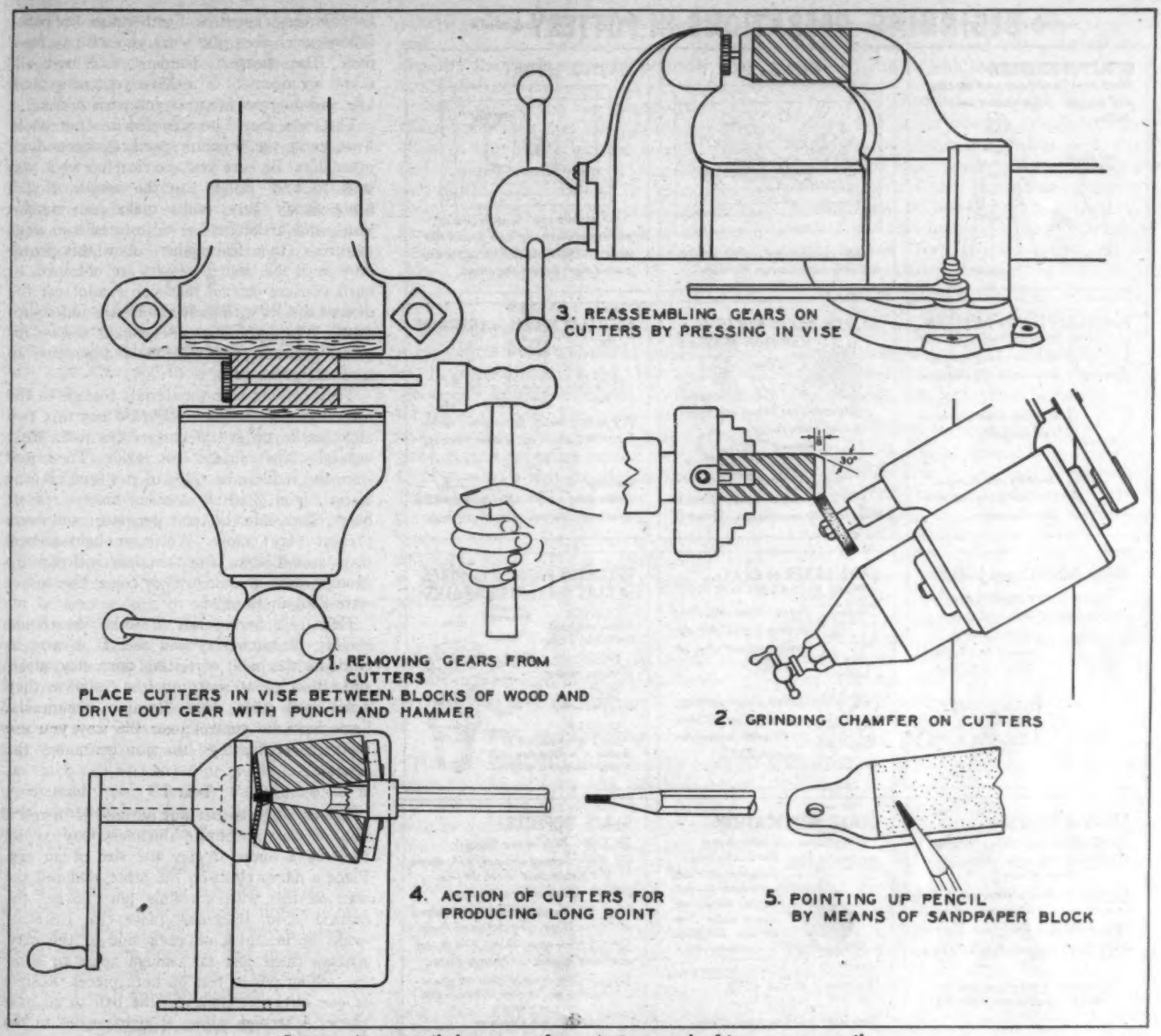
REVAMPING PENCIL SHARPENER FOR POINTING UP DRAFTING ROOM PENCILS

R. E. MURRAY
Co-ordinator, Trades Department
Public Schools
Fremont, Ohio

A number of used pencil sharpeners had accumulated at our school and since we wanted one that would produce a longer pencil point for drafting purposes, the writer determined to grind the shoulders of the cutters as shown.

Care has to be exercised in doing this, if the gears are left intact, or otherwise the gears will be damaged with the grinding wheel. The gears may be removed prior to the grinding operation by forcing them off with a small punch. Upon completion of the grinding operation, the gears can be easily pressed back on the cutters with the aid of a bench vise.

The new cutting angle should be parallel to the lead so as to coincide closely to the diameter of the same. Cutters can be chucked in


3. REASSEMBLING GEARS ON CUTTERS BY PRESSING IN VISE
1. REMOVING GEARS FROM CUTTERS
PLACE CUTTERS IN VISE BETWEEN BLOCKS OF WOOD AND DRIVE OUT GEAR WITH PUNCH AND HAMMER
2. GRINDING CHAMFER ON CUTTERS
4. ACTION OF CUTTERS FOR PRODUCING LONG POINT
5. POINTING UP PENCIL BY MEANS OF SANDPAPER BLOCK

Revamping pencil sharpener for pointing up drafting room pencils

the lathe and a small cut then taken off the shoulder, as shown, by the means of a tool post grinder. However, a micrometer should be used frequently to check diameter of butting edges so as to insure perfect alignment of cutters, which will in turn produce a smooth protruding lead.

The lead of the pencil is then pointed up as desired by hand on a sandpaper block or file.

THE POTTER BEGINS

ELMER A. MORROW

Chicago Teachers College

Chicago, Ill.

Many a person has said, "I wish I knew how to make some pottery." The making of pots is an ancient craft, and some of our Indians made and still are making excellent pottery. Pottery making is a fine hobby. In common with all potters, the beginners will have disappointments, but they will only whet their appetite for more knowledge.

Where Does the Beginner Begin?

The first thing needed is some clay. And how little do we know about clay. Clay is not a simple substance. It consists of a hundred or more different things.

The glazes and the clays are found in the same list of materials. The clay and the glaze or the body and the glaze must be suited to each other. The glaze is put on over the fired body. When the piece is again fired, the glaze must firmly unite itself with the body. When your attempts in this direction are not successful you must find the cause and correct the condition.

When you have secured a sample of the clay you wish to use, you will find it profitable to run some tests before you attempt to make any articles. These are firing tests. The proof of the pottery you will make comes only from the kiln-fired clay. It is best not to study the shaping of the clay before you learn how to prepare it and how it reacts in the kiln.

Before clay can be used by the potter it must be worked or wedged. Throw it forcefully on the table, knead it, roll it, and add water until the clay is wet, but not muddy. Pound all the air bubbles out of it. Work it into good *fettle*. When its condition is good, roll it in a moist cloth, and lay it away for a day where it will not dry out. A jar with a cover is a good place in which to store clay. Fire test your clay before using it. Even experienced sculptors need to do this since most of them have had no experience in firing clay.

BEGINNING OPERATIONS IN POTTERY
SCULPTURED WORK-
Must have good base and the clay well wedged. Larger pieces are hollow...
Will break at legs
DANGER!
Clay containing water will explode to pieces in the kiln.
WASTED EFFORT
Air pockets and bubbles in dry pottery will expand and break the ware. WEDGE the CLAY! i.e., throw, pound and knead the clay.
PORCELAIN is NOT POTTERY-
POTTERY IS NOT PORCELAIN
Walls too thin - NOT pottery - more like dishware.
Will fire if the clay is well wedged.
Too bulky and heavy... Difficult to dry and fire. Like stoneware.
ATTACH FRAIL PARTS to HEAVIER MASSES
WILL BREAK
Clay rolled too thin is weak before and after firing.
5-10% talc added to clay gives it strength and smoothness. Mix well!
EACH CLAY WARPS and SHRINKS
WET
DRY
FIRED
Dry pottery slowly. Learn to fire safely. Expect 10% shrinkage & some warping!
Lids and bodies must have same water content.
FRIED
Test ware level on broad surfaces.
AVOID BUBBLES and LUMPS-
Slip is a watery mixture of clay. Used in casting pottery forms in plaster molds. It should weigh about 28 oz. to the pint.
GROG ADDED to CLAY-
MAKES MORE STABLE CLAY BODY
Dry powdered clay, fired in an unglazed pot, becomes calcined clay, or fine GROG.
Broken glazed pottery, ground and sifted thru 20-40 mesh screen, becomes GROG.
TEXTURES FORMED by SIZES of CLAY MATERIAL GRAINS-
POLISHED (Hand-rubbed) Leather-hard clay
CUPS
SANDY (Sponged surface)
VASES, URNS
ROUGH (Grog added)
TILE TILES
COARSE (Add 2 grog sizes)
FLOWER POTS
Texture is in harmony with uses, colors, and weights.
KINDS of GLAZES-
CLEAR- (Foundation) Shiny, like glass.
STAINS- A little color, added to clear glazes.
STANNEOUS- Made white or pearly as by the oxide added to colour or to stains.
FRIT- Added to control glaze. Opaque.
MATT- Dull or eggshell surface. Opaque
ALL ABOVE GLAZES CONTAIN NO WATER-SOLUBLE MATERIALS.
GLAZE APPLICATION-
Colors show only after firing
DIP AND/OR POUR
Test on clay body - Amount of glaze and water must be balanced. Soak fired clay in water. Dry surfaces. Use glaze in a creamy mix.
SPRAY
Thin glaze with water
Dab with brush on small areas.
GLAZE DEFECTS-
TOO THIN- Body shows through.
TOO THICK- Lumpy and spoils the shape. Will bubble and run in the kiln.
UNEVEN- Wash off and try again.
CHIPS OFF- Increase or decrease amount of flint in glaze. Try different body.
CRAWLS- (Bare spots) Dirty - Fire to red heat and reglaze - or change glazes.
CRAZES- (Tiny cracks) Hold the glaze melted two or three hours longer.

Chart for pottery class

Why Make Fire Tests?

They will show how your clay will change color, shrink, warp, and crack. They show the texture of the clay and that fired clay has a *ring* when struck a light blow. You will learn to operate your kiln with an understanding of how a given kind of clay will respond to the heat. You will learn how your kiln operates as to ultimate temperatures, the temperature timing, holding the temperature, the various temperature colors, and how your kiln cools down. You must know that pottery is fired clay and not merely modeled clay.

Where Can I Get A Kiln?

You may buy it or make it. If you wish to make a kiln, buy the materials, and build it in the back yard. You will find the directions in a book by York Honore called *Pottery Making from the Ground Up*. If you want an electric kiln for inside use see an article by the author, "A Homemade Pottery Kiln," on page 263 of the June, 1947, issue of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, in which full directions are given. That kiln costs about ten cents an hour to operate. When you get far enough along to make saleable pieces, you may buy a larger oil-fired or gas-fired kiln.

Why Should I Operate A Kiln?

Because you should know what it is possible to obtain from a kiln so that you may make your plans. Usually one is not sure what results will be obtained until tests have been made.

The use of a commercial kiln is out of the question. Transporting materials back and forth is very expensive. Furthermore the other fellow never does just what you wish to have done. The cheapest, handiest, and best all-round arrangement is to have your own small kiln and do your firing as you wish it done.

The tests should be recorded in a notebook. First enter the original specifications and all other data. Be sure you are clear on what you wish to find. Enter also the results of the firing. Study these results, make your conclusions, and make further adjustments in your materials; then fire again. Follow this procedure until the desired results are obtained, or until you are certain that you cannot get the desired results with your knowledge and equipment. When you have developed a *hard-to-please* attitude, you will be in a position to turn out good work.

There should be no materials foreign to the clay materials in your clay. Do not mix two clays until you get to know clays well. Most natural clays contain iron oxide. The more iron, the redder the color of the fired clay or biscuit. Iron (Fe0) fires either brown, red, or black. These are the most persistent and ever-present clay colors. White or light-colored clays stored in an iron container will pick up enough oxide to change their color. Use stoneware containers only.

Here is a base series of tests you should employ for each clay you use. It is wise to cultivate the habit of testing since clay, glaze, and all such materials, must be tested as they come into your shop. Because commercial firms have no control over the way you use their materials, they do not guarantee the product.

Test I

Let us suppose that our purpose is to roll a slab of clay a definite thickness, say ¼ in. Moisten a lump of clay the size of an egg. Place a damp cloth on the table, and roll the clay on this with a rolling pin. To get the desired ¼-in. thickness, place two strips of wood ¼ in. thick on each side of the clay, spacing them just far enough apart to allow the rolling pin to rest on both pieces. Rolling in one direction elongates the ball to an oval shape. A second rolling at right angles to the first will make it assume a round shape. Cut a square from this rolled slab, using a blunt, dull cutting edge. Carefully scratch on the square two marks separated by a distance of 1 in. Punch or drill a hole near the top edge and scratch a test number to one side. Lift the slab by lifting the cloth. Measure the thickness carefully and the distance between marks when wet. Also test for flatness. After the slab is dry measure again, and compare. Then fire the slab, after which measure again, and compare with the two previous measurements.

Results — Test I

Your clay should show a shrinkage of not more than 10 per cent by measurement. The less shrinkage, the better for your purpose. All moist clay pieces should be dried slowly in a closed compartment. This will reduce shrinkage.

To reduce warp, add feldspar (orthoclase) up to 20 per cent by dry weight. Add only

enough to reduce the warp to manageable proportions. Too much feldspar will raise the firing point. Feldspars are all refractory, that is, they resist the fire.

For the second test, if needed, make up two or three slabs with different amounts of spar. If the second test is not satisfactory, discard the clay, and try another.

A fired piece is held lightly, in one hand, and struck gently with a pencil to show the degree of density due to the fire. Low fire, low density, and high fire, high density is the rule.

Test II

Take a wad of moist clay, and roll it into round rod-shaped forms by hand on a damp cloth on the table top. Make two more, the first 1 by 2 in., and the second 2 by 4 in. Dry and fire.

Results — Test II

This test will indicate the limits of mass for this clay. Any clay will work up best at a certain thickness and at a certain temperature. There is always some latitude in all good clays, and you are testing to find the best thickness or mass.

Do not attempt to make thin dishes, cups, or ornaments of potters' clay. The colors will not be near enough to white, the warp is too great, and the fire is not hot enough, that is, at cone 04. Pottery fired below cone 04, which is approximately 1000 deg. C., or 1832 deg. F., has very little value. Later, when you have had experience, you can use a kiln which gives nearer a stoneware temperature. The temperature for porcelain is still higher. Rods that are too thick will be twisted or cracked. You will understand from this that there must be a good uniform mass even if the piece must be made hollow in order to fire well.

Test III

Take a lump of clay the size of your fist, and put it into the kiln without drying it out. Make a second one into which you press a pencil end to the depth of half an inch. Seal this hole over with moist clay, but do not fill the hole. Dry thoroughly and fire.

Results — Test III

The moist or wet clay will explode and fly into pieces. The interior steam will shatter the piece. To fire well all clay pieces must be dry. When a dry piece of clay is touched to the cheek it will not feel cool. It is wise to put dry pieces on top of the kiln or in the warm kiln room the day before they are to be fired.

The air in the hole in the other piece, even when the clay is dry, will expand when heated and will crack or chip the piece. An air hole as small as a pinhead will do this. For this reason all clay should be well wedged.

Test IV

Make a small slab of about 1-in. square for each glaze you want to use on a given piece of clay. Rub a dab of glaze powder with water to a thick cream mix. This is blotted on the clay with a brush. Glazes cannot be painted on like water color or oil paint. Put three stripes of glaze on each slab, but keep the stripes separated. The first should be such as you believe would be too thin a deposit; the second should be smooth and just the right deposit; the third should be deposited much too thick. Mark each slab with a glaze number or letter so that you can identify them later. Glazes show their true colors only after firing. Glaze is not usually put on green (unfired) clay. On this small piece it will work fairly well if you do not dissolve the green clay by means of the water in the glaze and with the handling of the brush. All fired pottery is called *bisque* or *biscuit* before glazing.

Dry the slabs, and fire.

Results — Test IV

This will show how the glazes and the body work together. The amount of correct deposit can be figured from this test. The thickness of the deposit is very important. It varies with the different glazes. The texture of the biscuit has a marked effect on the action of any glaze. A sandy or rough surface will give a *dry* effect even in a well-glazed job. Too heavy a deposit will bubble, and these bubbles may burst, leaving craters, or it may run down in lumps or drop off the piece. Dirt on the piece and finger marks will cause the glaze to crawl or leave bare spots. Too high a silica content will cause the glaze to peel off.

Test V

Dry a small handful of clay. Pound it to powder and fire in a loose pile on the floor of the kiln. Fire with the other tests.

Results — Test V

This test shows that clay particles must be compact within a water film (wedged) before they will fire into a resonant mass. Loose clay particles are fired but will not hold together. This is called *grog*. Grog is also made by grinding broken pottery. True grog contains glaze. It must be screened and sifted to control the size of the particles.

Grog is added to unfired clay by weight up to 40 per cent. This clay and grog mixture is caled terra cotta and is used for modeled pieces, figures, and the like. It also has its mass limits. As a color base for glaze, it is not good. It is customary to cover it with a thin layer of clay of more satisfactory color called an *engobe*.

For any special job, a terra-cotta mix can be formed roughly into the mass which is proposed. If this fires successfully the chances are fair that it will come out as expected. However, good results with any clay are dependent on the methods used in wedging, drying, and firing.

Terra cotta must have a longer "soaking" period in the kiln than the clays just described. If the temperature is raised too rapidly the results are often disastrous.

Test VI

Roll out a sheet of moist clay as thin as possible. This is done on a damp cloth so that it can be lifted. Cut with a dull edge into leaf and other forms. Bend and shape these into ruffled edges, twists, and frills of all kinds. Stick a few of them together with a creamy mixture of water and clay called *slip*. Use slip as you would glue. Dry slowly in a closed container or cabinet covered with a slightly damp cloth. Fire these with the other tests.

Results — Test VI

This test shows whether or not you have used this clay below its critical mass. Clays that are too *long* should be made right by the addition of a small amount of feldspar, a small amount of talc and whiting (lime) not over 2 per cent by weight. This will help to make a *short* clay. It is less plastic but will fire with less change, especially in small pieces. It is not as strong as the long clay at this temperature. If more than 2 per cent of whiting is added it will act as a flux, and the ware may collapse in the kiln. Lime below 2 per cent is a refractory, but above 2 per cent it acts as a flux, that is, it yields to the fire.

Where to Look for Clay

Pottery clays firing around cone 04 are not too plentiful. It is best to use the clay which gives the best results in your hands.

Near Ottawa, Ill., is a large deposit of kaolin. Kaolin, kaolinites, and ball clays are found in Tennessee, Georgia, Florida, California, and many other places. They are all judged by the standard English ball clay. This cannot be used alone with much success.

Manmouth clay, sold by the Western Stoneware Company, is much used in the middle west. The American Clay Arts Co., of Indianapolis, Ind., makes and sells several clays to be used as bodies to go with their glazes. Drakenfeld and Co. of New York makes several bodies, as well as many other ceramic products.

You may find a good clay in your neighborhood. An eighth-grade teacher went on a picnic with her class. After lunch one of the boys found a clay bank near a creek. They took some of the clay home, cleaned it, and later fired it satisfactorily.

One of the clays dug from the Chicago subway and carted away to the dump fired into a beautiful light brown which, for some uses, did not require a glaze. Chambers of commerce in many parts of the United States have samples of such materials and can furnish the information desired. The Porters Creek clay, found in most of the gulf states, does not fire well without treatment. This is the clay which sticks like glue to automobiles both when it is mud and when it is fine dust.

State universities and various departments of state governments can often supply information on local clays. Many of these have good departments of ceramics. Several states do more in ceramics than others, notably Ohio and Pennsylvania. The Ceramic School at Alfred, Pa., is one of the best.

You may be able to secure good potters' clay in small amounts from local commercial potters. Each and every clay should be tested by the one who is to use it. It does no harm to test each new batch. Careful, thoughtful work has always paid the potter well.

It needs to be emphasized again and again that the beginning potter must not accept clay merely on the recommendation of one who merely *should know*. Recommendations are

valuable, and much can be gained from them; but the firing tests will show the beginner, what he can expect of a given clay under the conditions in his own shop. Then if the results are not satisfactory he must add simple materials and change his handling so that he secures a clay satisfactory to him and his working knowledge and to the equipment at his disposal.

When a good clay is found he can then begin making articles from it. When he later finds it does no longer suit he can test others until he finds one that offers additional advantages.

A HANDY DRAFTING CASE

BERGEN DEWEES
Industrial-Arts Instructor
Herrin, Ill.

The drafting case, shown herein, is very compact and handy, and fills many needs of the student or professional draftsman. The design and the materials used are optional. It may, of course, be made of two-tone woods,

Drafting case

with inlays and decalcomanias to distinguish it from an ordinary box.

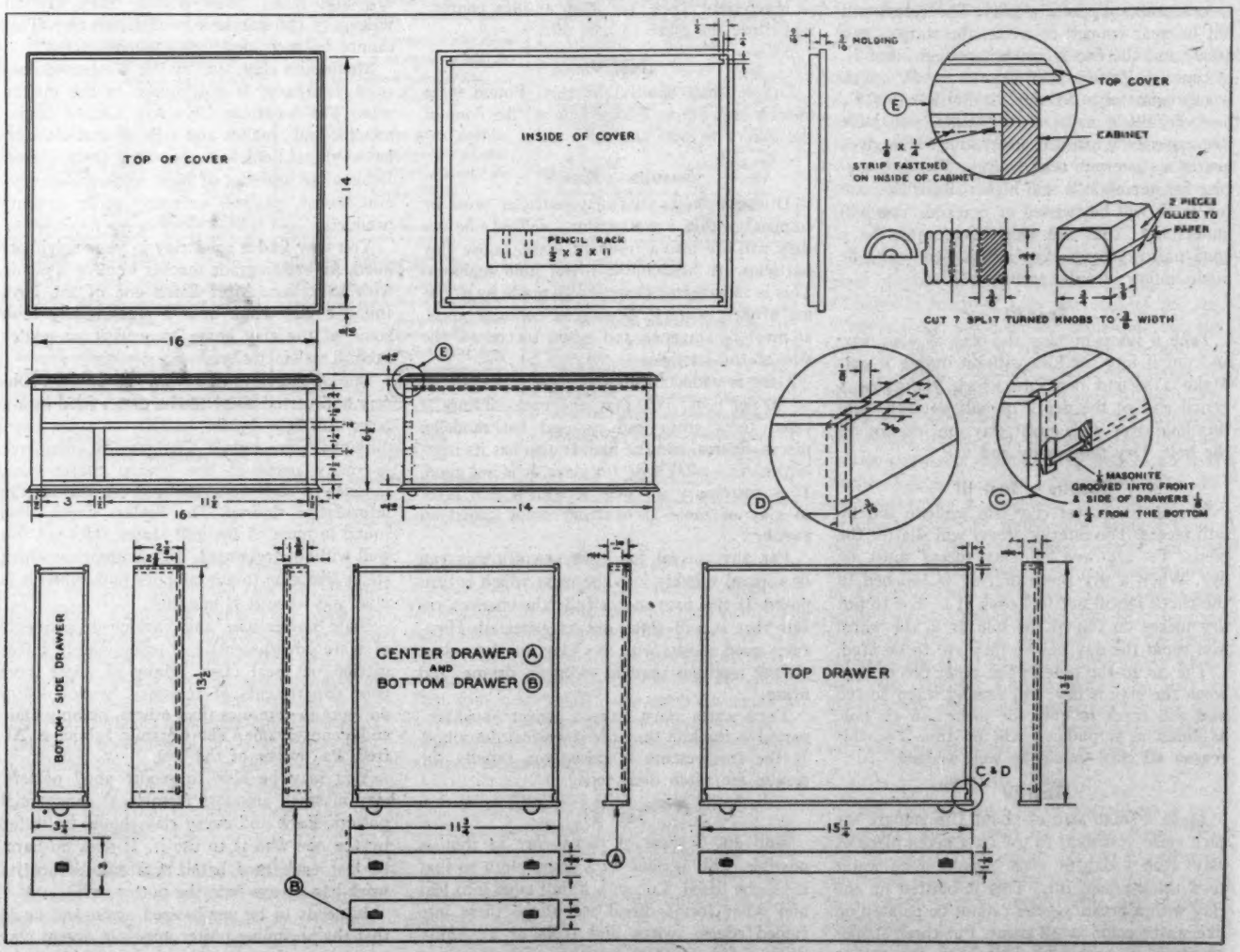
The construction of the box will tax the ingenuity of any craftsman.

Plywood and masonite should be used wherever possible to cut down the weight. Back of the hinged lid is ample space for lettering guides, pencils, and small triangles.

The shelf under the lid houses the larger triangles and irregular curves. One drawer is built to accommodate the drafting instruments. Another drawer is for ink, thumbtacks, and erasers. The other drawer is for scales, files, and miscellaneous items.

The case as a whole is a good unit for instructional purposes because (1) it has most of the common wood joints pertinent to woodworking, (2) it makes a good unit for wood finishing, (3) it gives an excellent unit for the drafting problems both in plain views and perspective views, (4) it gives an opportunity to perform many machine operations in making the various mortises, rabbets, dadoes, miter joints, and grooves, (5) it gives an unusual opportunity for a special wood lathe operation, and above all, (6) because of its design, it will give the craftsman or student a good workout in accuracy.

The shape of standard highway signs have a definite meaning. For example, the stop sign always is octagonal, and should be heeded even if the lettering is obscured. —*National Safety Council.*


TOP OF COVER
INSIDE OF COVER
PENCIL RACK
MOLDING
TOP COVER
CABINET
STRIP FASTENED ON INSIDE OF CABINET
2 PIECES GLUED TO PAPER
CUT 7 SPLIT TURNED KNOBS TO WIDTH
MASONITE GROOVED INTO FRONT & SIDE OF DRAWERS FROM THE BOTTOM
BOTTOM - SIDE DRAWER
CENTER DRAWER (A) AND BOTTOM DRAWER (B)
TOP DRAWER
C & D

Details of drafting case

WIND TURBINE — A BEGINNING SHEET-METAL PROBLEM

JOHN C. KLIER
Baltimore, Md.

The wind turbine shown in Figure 3 is a toy that seems to have a universal appeal to students of the seventh and eighth grades. Place several samples on the window sill or in front of an electric fan before the class enters the shop, and act as though the wind turbines were not there at all. Before long, someone of the students is almost sure to ask, "May we make those things today?"

As the period draws to a close, most of the fast workers will forget to ask "What do we do now?" and those who do ask may be told to figure out and explain to the class the principle on which the toy works. Slow workers redouble their efforts in order not to be left out of the fun.

Boys readily understand the need for accuracy in measuring and following directions in order to produce a satisfactory article. In the writer's shop, this job was graded on the following basis:

Excellent — outstandingly neat and precise work

Good — directions followed in a reasonably workmanlike manner

Fair — directions followed with apparent lack of skill

Poor — inaccuracy or failure to follow directions

Deficient — not given as a mark — work so poorly done that the spinner would not function, had to be scrapped, and started over from the beginning.

Boys receiving the grade of *poor* were told that if subsequent work was well done, the first day's errors could be overlooked in computing the term average. Those who did *fair* work were encouraged to believe that skill would come with practice. *Good* or *excellent* work was, of course, complimented. Most of the work was rated *good*. Needless to say, this kind of start did much to insure student success and eliminate headaches for the teacher during the remainder of the term. Student reaction was indicated in an overheard conversation:

"Gee, I like this! Ya do good stuff in sheet metal."

"Yeh, but ya gotta do it right!"

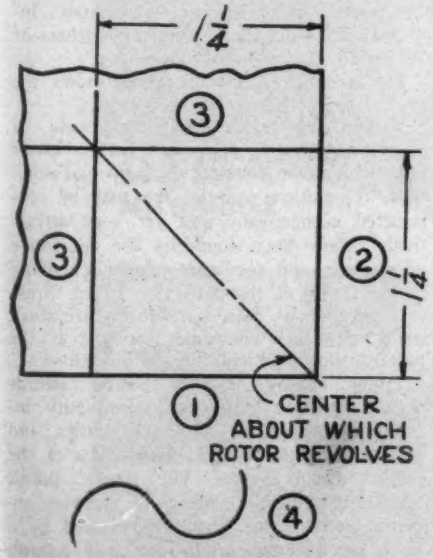


Fig. 1. The rotor and method of forming it

Operations to be Taught for This Job

1. How to read a working drawing
2. How to lay out straight lines and square corners on sheet metal
3. How to mark off duplicate dimensions
4. How to lay out parallel lines
5. How to read a foot rule
6. How to find half of a "mixed number" dimension

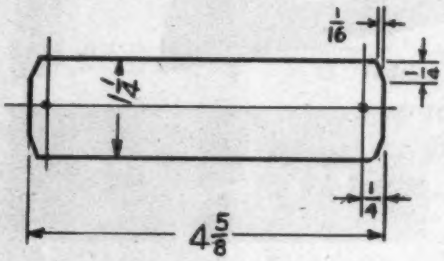


Fig. 2. The frame

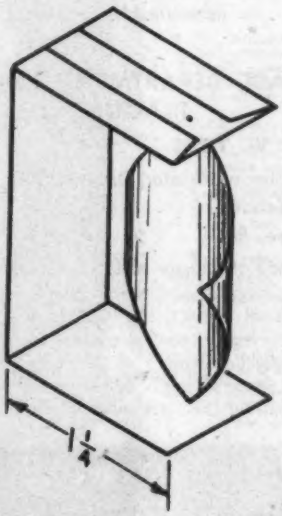


Fig. 3. The finished wind turbine

7. How to cut straight edges with snips
8. How to fold a single hem
9. How to mark metal with a prick punch
10. How to form curved surfaces on a stake
11. How to use flat nose pliers to make right-angle bands

Material: Tin can stock, or scrap IC thin plate, or lighter gauge.

Procedure:

A. The rotor — 1½ by 1½ in. See Figure 1.
1. Lay out and cut straight edge.
2. Lay out and cut square corner.
3. Lay out and cut other edges parallel with first two.
4. Form on any suitable stake.

B. The frame — 1¼ by 4⅝ in. See Figure 2.
1. Lay out and cut straight edge.
2. Lay out and cut strip 1¼ in. wide.
3. Lay out and cut to length with square ends.
4. Notch corners 1/16 by ¼ in.
5. Locate and make prick punch marks for bearings.
6. Hem edges ¼ in. so that hems will be on the *outside*.
7. Make right angle bends 1¼ in. from each end.

C. Assemble, adjust, test, and have work marked.

Tools Used: rule, try square, scriber, dividers, prick punch, snips, mallet, flat nose pliers, bar folder, stakes (needle case, candle mold, blow horn).

USEFUL TEACHING AIDS

WILLIAM H. APPELDORN
Machine Shop Instructor
Sewanhaka High School
Floral Park, N. Y.

While teaching industrial arts or vocational education, the teacher is frequently confronted with problems that become time consuming in his efforts to assure full comprehension on the part of the student. Proper visual aids at the right time are often tremendous timesavers and produce a more thorough and lasting impression.

Fig. 1. Front view of tempering model

The visual aids, mentioned in the following, proved very helpful in the machine-shop course at the Sewanhaka High School, Floral Park, Long Island.

Tempering

In order to expedite a demonstration on tempering to beginners, which under the old method was demonstrated by means of a cold

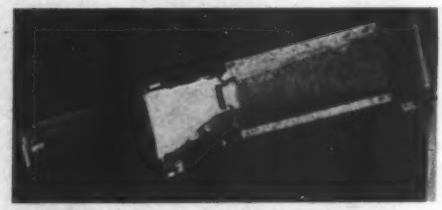


Fig. 2. Rear view of tempering model showing scroll and scroll guide

chisel and could at best be shown to a group of three or four boys at a time, a working model (see Fig. 1) of a cold chisel about 6 ft. long was constructed. The half shell of the chisel was made of 22-gauge galvanized sheet metal. The flat face was cut out and a piece of glass was inserted. Behind this glass a scroll was mounted on which the tempering colors were painted. A guide for the scroll was bent out of the same sheet metal and attached at the back of the face. See Figure 2. The model was then mounted on a piece of 3/4-in. plywood. Painting the board dark green and the chisel black with its polished ends aluminum added to its attractiveness. A flame, painted at the end of the face, indicated the position where heat must be applied to assure the travel of the colors in the right direction.

By means of this model the instructor is able not only to demonstrate the running of the temper colors to the entire class at one time but to stop the colors at any desired place, which under the former method was impossible.

Taper Turning

The second model, shown in Figure 3, is made of hardwood and constructed by the students in the shop. It serves to simplify the terms *taper per foot, taper per inch,* and *tailstock offset.* The 12 disks of the tapered

Fig. 3. Model of taper fully assembled

section are each 1 in. thick with the largest 6 in. and the smallest 2 in. in diameter. The disks are mounted on a 3/4-in. dural rod. The taper equals the large diameter minus the small diameter (L — s) or 6 in. minus 4 in. equals 2 in. Since the length of this tapered section is 1 ft. we have a taper of 2 in. per foot. By separating the 1-in. disks (see Fig. 4) it can readily be seen that in order to get taper per in., one need only take the taper per foot and divide it by 12. Thus we get

$$\frac{\text{taper ft.}}{12} = \text{taper per in.} \quad \left(\frac{2}{12} = \frac{1}{6} \text{ per in.}\right)$$

The tailstock offset for any simple taper equals

$$\frac{L - s}{2} = \frac{6 - 4}{2} = 1 \text{ in.}$$

If taper per inch is known the same result will be achieved by

$$\frac{\text{taper per inch} \times \text{length of tapered section in inches}}{2} = \frac{1/6 \times 12}{2} = 1 \text{ in.}$$

Since, however, in machine-shop practice the occurence of simple tapers is rather infrequent, we shall now add the hexagonal and the threaded section 5 in. and 7 in. in length, respectively. See Figure 3. The taper has not changed but obviously the amount of the tailstock offset must be changed. This can be demonstrated by putting the model in a lathe, keeping the tailstock offset in the same position and running a dial indicator along the tapered section. Now, to find the correct amount of tailstock offset we merely need to take the taper per inch and multiply by the total length of the work divided by 2. A simple formula for any similar piece of work would then be

$$\text{tailstock offset} = \frac{\text{large diam.} - \text{small diam.}}{\text{length of taper in in.}} \times \frac{1}{2} \times \text{total length of work}$$

or

$$\frac{6 - 4}{12} \times \frac{1}{2} \times 24 = 2 \text{ in.}$$

Fig. 4. Taper model with ends removed and tapered section separated by inches

TRADE DEPARTMENT AWARD PLAQUES

JOHN W. TITUS
Instructor of Related Drafting
High School
Latrobe, Pa.

Among the many civic organizations sponsoring forensic and achievement contests in our school district, the local Lion's Club has recently inaugurated a contest for seniors in the trade department of our high school.

The contest is divided into four divisions representing the four shop activities: namely, woodshop, electric shop, machine shop, and drafting. Individual monetary awards were made to the winner of each shop activity. Craftsmanship, design, and utility were the basic factors upon which the projects were judged. Recognized craftsmen from local industry were selected to serve as judges in the contest.

Award plaque

In addition to the material award, the club financed the making of four recognition plaques, one for each of the four shops. The plaques were designed in the high school drawing room and later made in the woodshop. Clear, close-grained mahogany were selected for the job. The major portion of the plaque measured 13 by 18 in. with a quarter circle of 3-in. radius cut out of each corner. A right shouldered ogee cutter was used to edge the board after which it was properly prepared and given an oil finish.

Cast brass pattern letters ¾, ⅝, and ½ in. in height were used for the lettering on the face of the plaques. The top facets of the letters were lightly filed for a brighter appearance after which they were secured to the face of the plaque with DuPont cement. Finally all the letters were lacquered to prevent tarnishing.

All four plaques were identical in design but for a 3/16-in. overlay panel bearing the name of the shop activity. Relieved as it was, it broke the flatness of the plaque. The club insignia was also accentuated by an overlay about 3/16 in thick.

Each successive year, the name of the winner will be hung from the bottom of each plaque; his name and year being placed on a small chamfered panel which will be suspended from the name panel of the preceding year. Small brass eyelets were used to connect the panels. One eyelet was opened and inserted into the other eyelet after which it was again closed. Each shop displays its particular plaque throughout the year.

Climaxing the contest, a dinner was tendered the winners by the club. At this time the respective awards were presented. Included among the guests were the teachers of the department and the judges.

The accompanying illustration shows the general characteristics of the plaques.

Various adaptations may be made of plaques in a variety of designs. Service honor rolls, home-room competition, perpetual scholastic recognition, and the like, may be constructed economically and yet very attractively. Many brass foundries list decorative adornments and appliqués which contribute to the theme of the particular award. Brass or bronze eagles, flags and wreaths are stock items with such companies, as well as the patternmakers' letters already described.

Public display of such contest awards usually promote the desired community interest and approval in the activities and objectives of the various departments of the public school system. The general public appreciates tangible evidence of the work accomplished by the schools. Sponsored by a civic or fraternal group not only assures attractive awards but also organized publicity of the contest.

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OLIVER P. EITZEN
Washington Junior High School
Bakersfield, Calif.

Here is a cup and saucer rack which can be built by the junior high school shop student and which will be an attractive and useful ornament in the home.

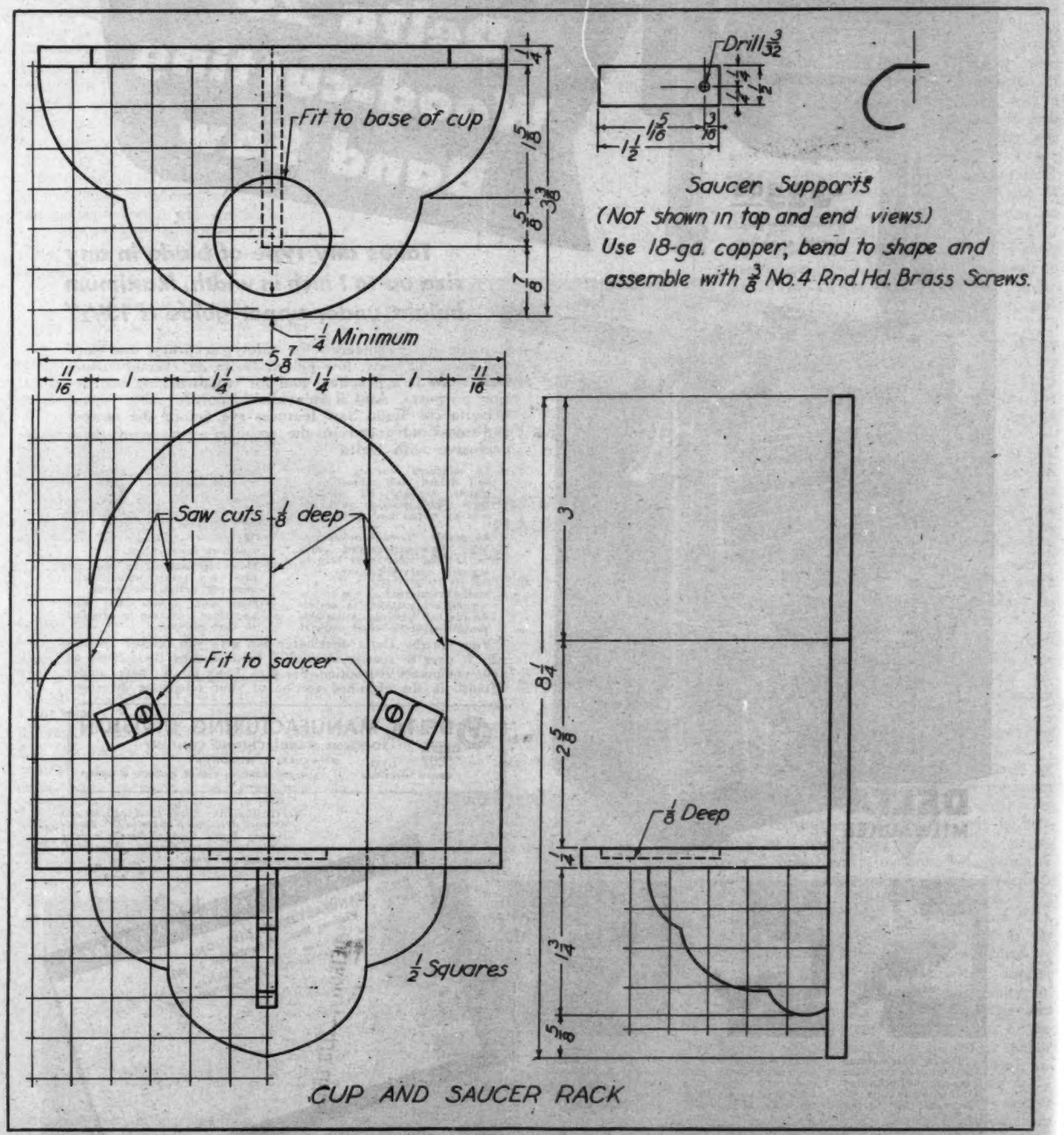
The plans are intended for demitasse size; however, the patterns may be proportionately increased to accommodate a full size cup and saucer. It is wise to have the actual dimensions of the cup and saucer to be used beforehand, as sizes vary considerably.

Almost any wood of ¼-in. thickness may be used, however, hardwood is recommended. Plywood is not too advisable inasmuch as most edges are exposed.

The grooves add much to the enrichment of the surface of the back piece. They should be about 1/16 in. deep and may be cut with a backsaw guided with a scrap piece of wood clamped along the line as a straight edge. This should be done as soon as the layout of the pattern has been made.

A coping saw or a jig saw is used to cut out the three pieces of wood.

(Continued on page 26A)



Details of cup and saucer rack

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2 What type of furnace is best suited for school shops? Answer: Indirect flame type.

3 What characteristics of aluminum affect foundry practice? Answer: Aluminum's tendency to absorb hydrogen and to combine with oxygen.

4 How are these problems overcome? Answer: Largely by melting, holding, and pouring at low temperature, and minimizing agitation.

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Personal News

PROFESSOR WALTER FRILEY DIES

Professor Walter Friley, who taught in the industrial-arts department of the Kansas State Teachers College, Pittsburg, Kans., for the past eight years, died Tuesday, November 11, at his home in Pittsburg.

Mr. Friley was born July 9, 1883, in Labette County, Kans. He taught industrial-arts work at the Independence High School and Junior College for 32 years, and then joined the faculty of the State Teachers College. His kind, unassuming manner endeared him to faculty and students alike.

Professor Friley was a member of Kappa Delta Pi, and Epsilon Pi Tau honorary fraternities, Kansas Vocational Association, and the Southeast Kansas Industrial Education Association. He was a past president of both of the last named organizations.

He received his master's degree from the University of Wichita.

DR. C. V. KIRBY DIES

Dr. C. V. Kirby, retired director of art education in the Harrisburg, Pa., department of public instruction, died at his home, after a week's illness, at the age of 71.

Dr. Kirby retired from his state post in June, 1946, after 26 years of service. He represented the commonwealth at international art conferences in Munich and Geneva before World War II.

Surviving are his widow, his mother, a son, and a brother.

♦ Dr. William F. Rasche, director and principal of the Milwaukee vocational school, Milwaukee, Wis., accepted an invitation from the Dayton, Ohio, board of education to serve on a committee to make plans for a vocational survey to determine what facilities will be needed in a $2,000,000 vocational school Dayton is planning. The technical committee is to make the basic plan for the survey which probably will be made by the research division of the University of Ohio.

♦ William Huss, supervisor of cadet teaching at the Oswego State Teachers College, is now presenting a special program entitled "Features That Sell Industrial Arts" in various parts of the country.

The program consists of a one and one-half hour illustrated lecture in which these selling features are colorfully presented. Mr. Huss, throughout his travels and supervising program, has captured outstanding features of many industrial programs in a fine group of Kodachrome slides. These slides depict features in many types of programs and varied situations which can go far in raising industrial arts in the estimation of the public.

This program was an outstanding feature of the Annual Spring Conference of Industrial Arts Teachers at Oswego, and Mr. Huss is now receiving many requests for presenting it at other professional gatherings.

On September 25, Mr. Huss spoke before a group of more than 45 industrial-arts and vocational education teachers at Auburn, N. Y., and on October 23, at the Indiana Vocational Association convention at Indianapolis.

♦ Dr. Cecil Robert Hutchcroft has accepted the position of professor of industrial-arts education at the State Teachers College at Oswego, N. Y.

Dr. Hutchcroft received his A.B. and A.M. degrees from the Colorado State College of Education. He received his Ed.D. from Columbia University and then became professor of industrial arts at the Colorado State College of Education.

In 1942 Dr. Hutchcroft entered the army air forces and became training inspector for Headquarters of the Training Command. He returned to Colorado from the army in 1946.

Among Dr. Hutchcroft's professional achievements is the coauthorship of the book which appeared in 1941, *What Our Schools Are Teaching*.

♦ H. J. Askren has been appointed co-ordinator for the public schools of Lafayette, Ind.

He is a native of West Lafayette and was educated at Purdue University. He received his bachelor's degree in 1926 and his M.S. degree in 1935.

Mr. Askren has taught at Harrisburg, Ill., and Hammond Technical High School, Hammond, Ind. He enlisted in the navy in 1942 with the rank of lieutenant in ordnance. After his discharge he took a position with the Aluminum Company of America at Lafayette as metal control supervisor, and it is this position which he leaves to take over his duties as co-ordinator.

♦ Pietrina T. Bertolini, of Boston, Mass., has been named administrative analyst in the office of the executive assistant to the commissioner of education, U. S. Office of Education, Washington, D. C. She came to the office of education after five years of experience in programs and procedures with the national Office of Price Administration.

She received her B.S. degree at Simmons College, Boston, in 1935, and studied in the Graduate School of Business Administration at Boston University.

♦ Arthur Roll has accepted the position as instructor in the general shop of the Oswego State Teachers College. He comes to Oswego as a graduate of the State Teachers College of Newark, N. J., in 1936, having received his master's degree from Columbia University in 1947. Mr. Roll taught industrial arts for four years before the war in Fort Lee, N. J., Port Deposit, Md., and Rutherford, N. J. He was inducted into

(Continued on page 26A)

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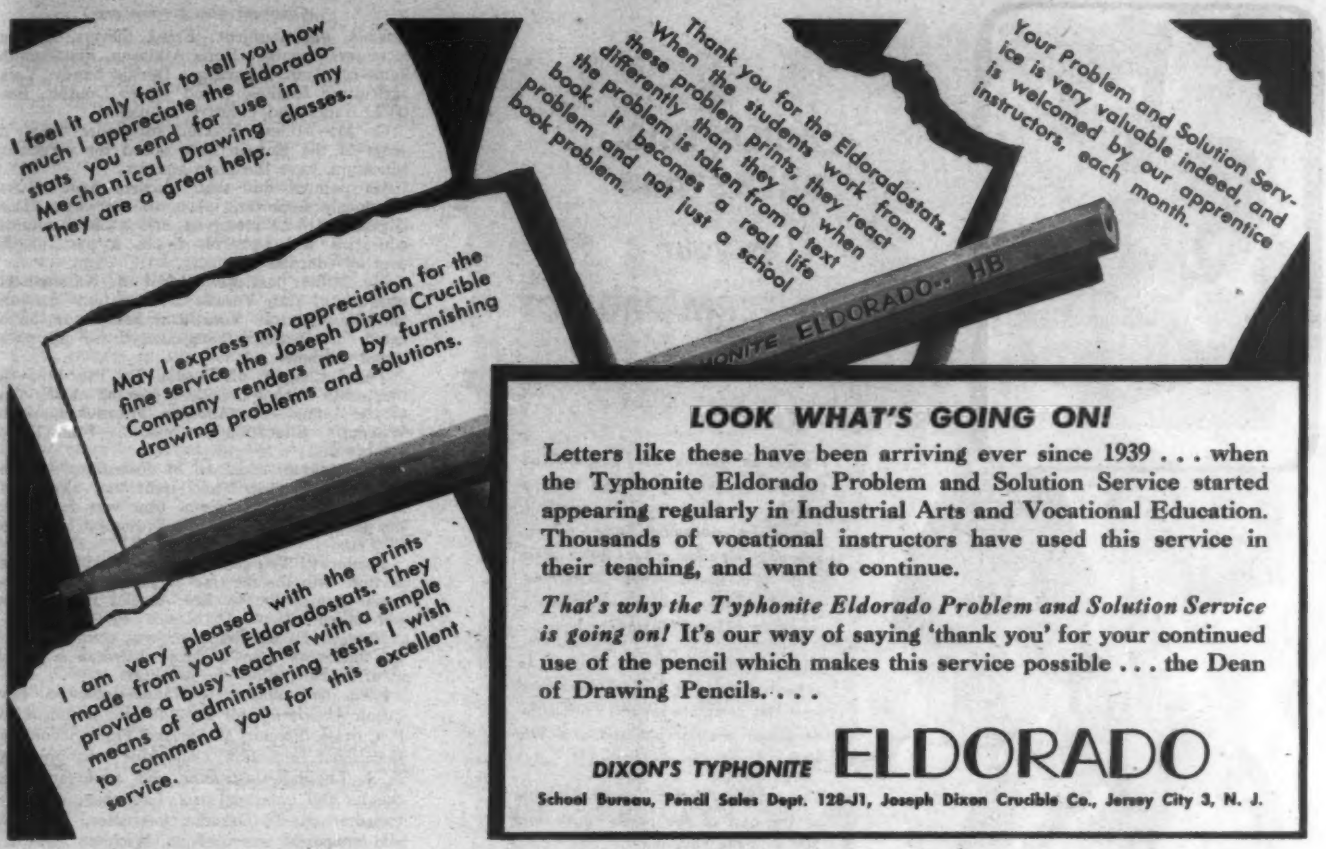
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ACCIDENT FACTS

The nation's bill for occupational injuries during 1946 totaled approximately $2,400,000,000, of which about $1,100,000,000 represented the immediately visible costs to both workers and industry including wage loss, expense of medical care, and overhead cost of compensation insurance.

The remaining $1,300,000,000 represented the estimated money value of damaged equipment and materials, production slowdowns and time lost by other workers not involved in the accidents.

Working time lost during last year, directly and indirectly, as a result of disabling injuries totaled about 280,000,000 man days — equivalent to the working time of nearly 1,000,000,000 men for a full year. — *National Safety Council.*

The only age group to show a decrease in accidental deaths in 1946 was the 5–14 year olds, which fell 8 per cent. Safety experts attributed the decrease to the effectiveness of safety education in the school age group, and the safety program launched by the President's Highway Safety Conference. — *National Safety Council.*

One-hundred thousand Americans were killed by acidents in 1946. — *National Safety Council.*

A lifetime can be spent in crossing a street. — *National Safety Council.*

Association News

♦ On November 8 and 9, 1947, a group of vocational administrators met in Syracuse and organized the Association of Trade and Technical Administration of New York State. This group is composed of directors of vocational education, and supervisors and principals of industrial and technical high schools. The membership will be composed entirely of representatives from local communities and the following were elected to office: president, Edward H. Lang, principal, Smith Technical and Industrial High School, Syracuse, N. Y.; vice-president, Horace B. Griffiths, assistant superintendent of schools, Utica, N. Y.; secretary, Nelson J. Murbach, director of vocational education, Batavia, N. Y.; treasurer, Ernest H. Colton, principal, Trade School, Rome, N. Y.

Executive committee: Francis H. Wing, assistant superintendent of schools, Buffalo; Harry T. Wilson, director of vocational education, Watertown; John B. Lillie, assistant superintendent of schools, Binghamton; William Pabst, principal, Brooklyn Technical High School; George F. Pigott, Jr., associate superintendent of schools, New York City.

The purpose of this organization is to maintain standards of teachers and instruction in vocational schools, to work through committees in studying and reporting on problems affecting these schools.

The organization is affiliated with the National Council of Local Supervisors of Vocational Education, and plans to work in close co-operation with representatives of the State Education Department in the development of educational programs for the training of youth for industrial employment. — *Edward H. Lang.*

♦ The Resource Committees for 1947–48 of the Michigan Industrial Education Society, consist of the following: Dr. G. Harold Silvius, chairman, co-ordinating committee; Dr. John L. Feirer, associate chairman, co-ordinating committee. Officers are: Claude A. Bosworth, president; Joel Lee, vice-president; Arthur L. Reagh, secretary-treasurer.

The following are chairmen of the committees mentioned: Frederick Brail, auto mechanics; Marshall Byrn, projects and improvised shop equipment; J. Herbert Cigard, printing; Arthur Dunham, plastics; Joe Giachino, aviation; F. R. Kepler, drafting; Frederick J. Lutz, safety; Ira C. Madden, teaching methods and aids; Augusta Ochs, trade and industrial education for girls and women; Gregory Robinson, apprentice training; Ward Sager, woodworking; William Stirton, vocational-technical education; Carl H. Turnquist, air conditioning and refrigeration; Stephen Vanke, machine shop; George Willoughby, rural shopwork; Lloyd Wolfe, adult education; and Roger Zinn, visual education.

♦ The Department of Industrial Education, Wayne University, Detroit, Mich., has recently organized an industrial education guild. The purpose of this organization is to provide professional and social activity for all active students in the department. The organization meeting was held on November 18, 1947, in the new student center (Webster Hall). The following officers were elected: president, Joe Konya, Jr.; secretary, Alex Kearney; treasurer, John Hija; and faculty sponsor, Gerald Baysinger.

♦ M. G. McCreight of Lincoln, Neb., was elected president of the Nebraska Vocational Association at the association's annual meeting held October 23, 1947.

Other officers named were: Florence Corbin,

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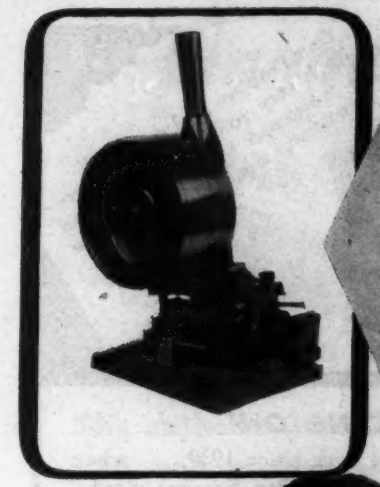

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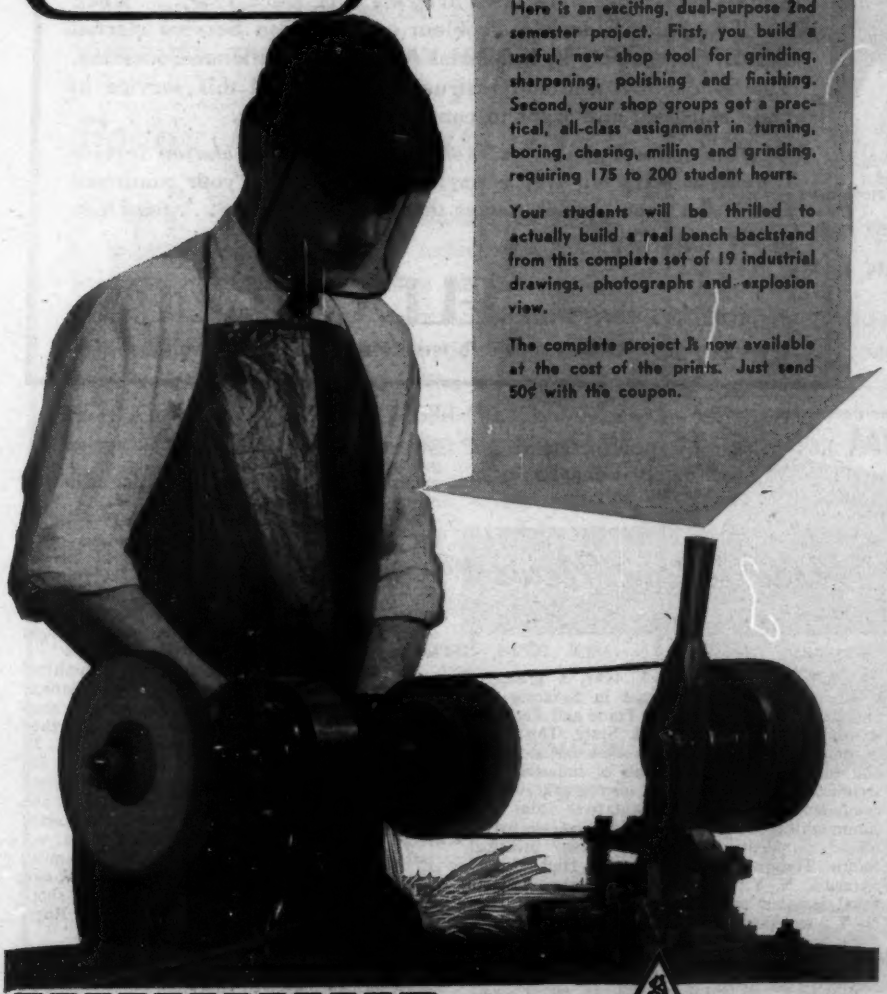

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Lincoln, vice-president; Frank Sievers, Lincoln, secretary-treasurer; Doris Atkinson, Plattsmouth, home-economics counselor; Donald Sandy, York, agriculture counselor; and James Douthit, Beatrice, trades and industry counselor.

C. M. Miller, director for more than 25 years of the Kansas state board for vocational education, gave the main address.

He pointed out that teachers have a tremendously important place in the years ahead if peace is to be preserved, and we in vocational education feel ourselves to be a part of the over-all education system.

Mr. Miller, past president of the National Association of State Vocational Education Directors, and the American Vocational Association, advocated "occupational competency" for all vocational teachers.

Theta Chapter of Epsilon Pi Tau held the fourteenth annual breakfast meeting at the time of the annual convention in Milwaukee, of the Wisconsin Education Association, Friday, November 7.

The program consisted of discussions "for the good of the order" and individual reports on activities and events. Some time was devoted to the discussion of the national program of Epsilon Pi Tau.

Epsilon Pi Tau plans for the activities in connection with the meeting of the American Vocational Association in Los Angeles in December were discussed.

Howard E. Rathlesberger was commended on the fine work done as local chairman in charge of arrangements for the breakfast.

♦ The new officers for Kansas Industrial Education Association for 1947–48 are: president, W. F. Currier, director, McFarland Trade School and Vocational Education, Coffeyville; vice-president, E. J. Logsdon, instructor, day trade auto mechanics and industrial arts, Lawrence; secretary-treasurer, R. L. Grandle, instructor, day trade and industrial arts drafting, Wichita.

♦ The Industrial Education Club of Iowa State College, Ames, Iowa, met on October 29. L. E. Wass, director of adult and industrial education, Davenport, Iowa, gave an address entitled "The Problem of the Beginning Industrial-Arts Teacher."

♦ At the annual Kansas Vocational Association luncheon held in Wichita, Kans., November 7, C. M. Miller, director, State Board for Vocational Education, and L. B. Pollom, state supervisor of agricultural education, were presented leather-bound volumes of letters of congratulations and commendation in honor of their 25 years of service as staff members of the Kansas State Board for Vocational Education.

The volumes were presented by R. L. Welton, Tonganoxie, president of the Kansas Vocational Association, and contained letters from both personal and professional friends throughout Kansas and the nation.

Mr. Miller was appointed director of vocational education in Kansas on June 24, 1922. He has served as president of the National Association of State Directors, and both as president and executive secretary of the American Vocational Association.

Mr. Pollom was Mr. Miller's first supervisor. On August 1, 1922, a little more than a month after Mr. Miller's appointment, the state board, upon the recommendation of Mr. Miller, appointed Mr. Pollom supervisor of vocational agriculture in Kansas, and he has served in this capacity ever since.

K.V.A. OFFICERS ELECTED

The following officers were elected to serve the Kansas Vocational Association in 1947–48, at the annual meeting of the K.V.A. House of Delegates meeting, held November 7, at Wichita, Kans.: Miss Nelle West, Wichita, president; Miss Irene Eisenhower, Solomon, vice-president, repre-

(Continued on next page)

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senting home economics; S. S. Bergsma, Ottawa, vice-president representing vocational agriculture; Edwin Marshall, Atchison, vice-president representing distributive education; E. J. Logsdon, Lawrence, vice-president representing trade and industry; F. E. Carpenter, Topeka, secretary-treasurer.

♦ On September 24, Dr. William E. Warner, national executive secretary of Epsilon Pi Tau, made a visit to the Phi Chapter of the Oswego State Teachers College at Oswego, N. Y.

A fraternity breakfast was held at which 24 members of the Oswego Chapter met with Dr. Warner and discussed current policy and local problems. Dr. Warner then spoke on the subject, "Present Trends in Industrial Arts."

♦ The officers of the Tucson Trades and Industrial Arts Association for 1947–48 are: R. A. Ganoung, president; Harry A. Goldstein, vice-president; and John Raymond, secretary-treasurer.

This organization is affiliated with the American Vocational Association, the Arizona Trade and Industry Council, the Arizona Educational Association, and the National Education Association.

♦ The New England Industrial Arts Teachers Association held their annual meeting November 7 and 8, 1947, at Hartford, Conn.

The convention opened with a luncheon at 12 noon on Friday, November 7.

The afternoon was given over to panel discussions in charge of the following chairmen in the areas mentioned: William C. Sloane, general shop; Thomas Montelone, general metals; Dwight Grant, audio-visual aids; Jack Crowe, general woodworking; Robert Ardini, graphic arts.

The banquet was held at 6:30 p.m.

Dr. Dean M. Schweickhard, commissioner of education, State of Minnesota, gave the main address on the subject of "Essentials to Survival."

Saturday morning the panel discussion started on Friday morning was continued under the same chairman, and covering the same areas as on the previous day.

Dr. Dean M. Schweickhard again addressed the convention at the noon luncheon.

♦ At the Industrial Arts Education club meeting of Virginia Polytechnic Institute on November 4, 1947, Dr. B. H. Van Oot, director of vocational and industrial-arts education, state of Virginia, gave an analysis of vocational and industrial-arts education in Virginia.

Officers of the club for the current year are: president, George K. Hawkins, Blacksburg; vice-president, Albert Folden, Pulaski; secretary-treasurer, Jesse M. Bratten, Staunton; reporter, Harry Rosenbaum, Norfolk.

The industrial-arts education program at Virginia Polytechnic Institute was inaugurated in 1946 under the supervision of Professor Joseph A. Schad, former director of trade and industrial arts education of the city of Newport News, Va.

♦ The third annual Oklahoma State Industrial-Arts Clinic was held at Camp Redlands on May 26 to 30. The object of these clinics is to improve the design of projects used in the industrial-arts shops of the state.

NOTICE

Efforts are now being made to compile a complete mailing list of all graduates now teaching, of the industrial-arts department of the Oswego State Teachers college. A quarterly newsletter is being mailed to all such men whose names and whereabouts are known.

If you are an Oswego Industrial Arts Alumnus, and have not received your October newsletter, please address a card to Robert D. Helsby, editor, newsletter, Oswego State Teachers College, Oswego, N. Y.

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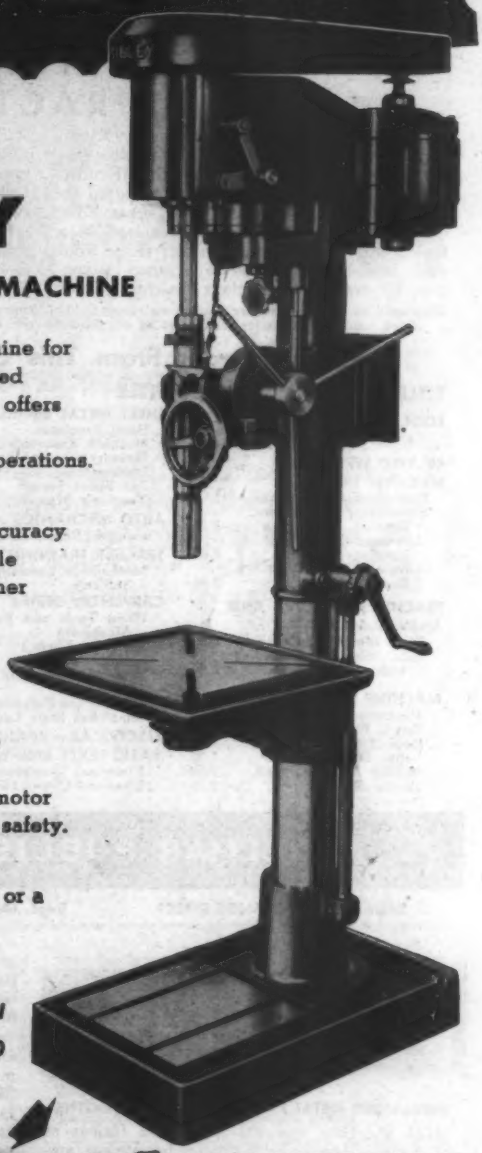

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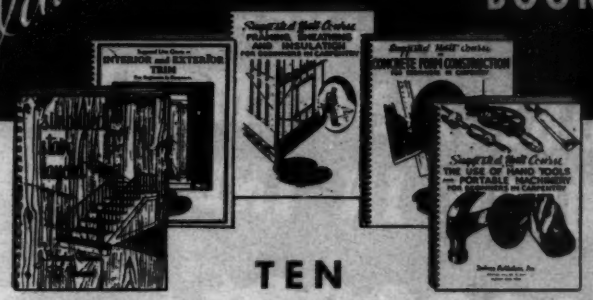

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1121. Q.: How can the angle iron frames of our welding booths be insulated to prevent arcing? — *B. P.*

A.: The angle iron can be insulated by applying several coats of four-pound cut shellac.

Gilsonite asphaltum, which contains little or no free carbon, will also act as a good insulator. —

ELECTRICAL PROJECTS EMBODYING MACHINE-SHOP WORK

1122. Q.: Please give me references to electrical projects which embody machine-shop work. I am particularly interested in motors and in a small solenoid engine which appeared several years ago in your magazine. — *T. L. H.*

A.: The following articles which appeared in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION may answer your needs: "Three-Phase Induction Motor," page 285, August, 1931; "Electric Engine," page 59, February, 1932; "Construction Data for 1½ Kva Single-Phase Transformer," page 349, November, 1933; "Model Lifting Magnets," page 328, October, 1934; "1/12 H.P. 110-Volt Universal Motor," page 361, November, 1934; "Small Electrical Transformers," page 154, May, 1935; "Solenoid Engine," page 223, July, 1936; "Simple Syncronous Motor," page 434, December, 1937; "Electric Engine," page 338, October, 1938; "Electric Weather Vane," page 308, September, 1943; "Variable Reactor," page 422, December, 1944. — *J. J. M.*

News Notes

♦ The Fisher Body Craftsman's Guild, General Motors Building, Detroit 2, Mich., now in its 18th year, will devote the 1948 program entirely to creation of what youths of today believe a motorcar should be.

A total of $65,000 in awards will be offered to youths throughout the nation who build the best model cars. This includes eight university scholarships for national winners, and 686 awards for state winners. In addition, there will be 40 trips to the national guild convention for regional winners. Competition again will be in two age classifications, 12 through 15, and 16 through 19, with identical awards in each.

In order to give more youths an opportunity to attend the national guild convention and compete for the scholarships, the country is being divided this year into 20 regions, with the junior and senior regional winners from each receiving expense-free convention trips. Last year there were nine regions.

The competition will close July 1, 1948.

♦ The number of apprentices in the building trades which the Apprentice-Training Service, U. S. Department of Labor, had listed at the end of October set a new all-time record, 109,738. This is an increase of 3½ per cent over the number reported for the end of September.

The following is a break-down:

Woodworking trades	39,926
Electrical trades	17,200
Pipe trades	16,558
Trowel trades	14,799
Painting and decorating trades	8,560
Sheet-metal trades	7,990
Other building trades	4,705

♦ The 1947 edition of "Accident Facts" may be obtained from the National Safety Council, 20 North Wacker Drive, Chicago 6, Ill., at 50 cents a copy.

♦ The 1948 Soap Box Derby racing cars will be different, and the new official rules, have already been formulated and approved by the National Rules Committee, which is made up of the National Newspaper Advisory Committee and the National Contest Board.

The 1948 cars will be built along simpler lines, with continued emphasis on safety, instead of the ultrastreamlined models which were fashioned after torpedoes, jet planes, or transparent submarines on wheels.

The committee decided to change the rules so that racing-car construction would be on a more equitable basis for all boys.

The committee deemed these changes necessary to counteract the tendency of car builders of recent years to construct their racers with windshields as an integral part of the car. No canopies, enclosures, or windshields of any type are to be permitted in 1948 cars.

The 1948 Derby will be held August 15, at Akron, Ohio.

♦ The 20th Annual Printing Education Week, sponsored by the National Graphic Arts Education Association in co-operation with The International Benjamin Franklin Society, Inc., and The Franklin Institute, will be held January 11–17, 1948.

♦ What was the student doing at the time of the accident? Was he using any apparatus, machine, vehicle, tool, or equipment? How was he using it? Was another person involved in the accident in any way?

These are some of the questions on a student accident report form available to school administrators from the National Safety Council. The form was developed by a committee, of which Dr. Zenas R. Clark, administrative assistant, Wilmington, Del., public schools, was chairman.

Write Miss Marian Telford, Senior Field Representative, School and College Division, National

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Safety Council, 20 North Wacker Drive, Chicago 6, Ill., for further information and forms.

♦ The training of youthful drivers is a No. 1 objective in highway safety activities according to national safety leaders who plan to give public recognition in the form of annual awards to states which meet and uphold certain high standards in driver training.

Three types of awards will be given. They are:

1. Meritorious Award — to each state having a full course in driver education in 25 per cent of its secondary schools and having enrolled therein not less than 25 per cent of the eligible students.

2. Superior Award — to each state having a full course in 50 per cent of its secondary schools and having enrolled therein not less than 50 per cent of the eligible students.

3. Award for Excellency of Achievement — to each state for achievements attained in the development of a comprehensive, state-wide high school driver education program. This special award will be made at the discretion of the judges and will be based upon program developments including such factors as preparation of teachers, percentage of annual increase of schools teaching driver education, percentage of annual increase of enrollment in the courses, colleges offering credit courses.

Announcement of the winners will be made June 1 of each year. The certificates and plaques marking the awards will be presented to the state governors.

For further information address Association of Casualty and Surety Companies, 60 John St., New York 7, N. Y.

♦ A revised edition of the catalog, "Motion Pictures and Slide Films for School Use," listing a number of new films, is now available from School Service, Westinghouse Electric Corporation.

Available free except for transporation costs, the films described in the catalog cover a wide range of subjects for high school classes. The booklet contains recommendations as to the type of class for which each film is best suited and suggestions for related supplementary materials to enhance each film's usefulness in the classroom.

Teachers may secure a copy of the new index through School Service, Westinghouse Electric Corporation, 306 Fourth Avenue, Box 1017, Pittsburgh 30, Pa.

♦ The National Geographic Society's School Service Division has announced that the publication of the Geographic School Bulletins was resumed for the 1947–48 school year on October 6. Each of the 30 weekly issues contains five articles and seven maps or illustrations.

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New Publications

Working With Plexiglas

Spiral binding, 72 pp., 8 by 10¼ in., illus., $1.50. Distributed by Studio Publications, Inc., 381 Fourth Ave., New York, N. Y.

A fine book for the beginner whether he is a student in the school shop or a hobbyist in the home workshop. It gives detailed directions and is well illustrated.

There are ten chapters which show how Plexiglas should be stored and handled; how it can be cleaned; how to cut and machine it; and how to form, join, and finish it. There also are chapters on designing, and about 30 well-designed projects are shown.

A list of sources for cleaning and polishing compounds, buffs, cleaners, waxes, and the like is appended.

Surveying Instruments: Their History and Classroom Use

By Edmond R. Kiely. Cloth, 411 pp., 6¼ by 9¼ in., illus., $3. Bureau of Publications, Teachers College, Columbia University, New York, N. Y.

An exceedingly interesting collection of historical data on surveying instruments devised by the early Egyptians, by the Greeks and the Romans, those produced in medieval Europe, Orient, and India, and during the Renaissance in Europe.

The book also contains a chapter on the development of practical geometry in the schools, and one on the application of geometry and trigonometry in simple surveying.

Purchasing

By Stuart F. Heinritz. Cloth, 671 pp., 5¼ by 8¼ in., illus., $4. Prentice-Hall, Inc., New York, N. Y.

The contents of this book present material originally used in a course on purchasing at Columbia University School of Business or gathered from experiences gained while acting as consulting member of the educational committee of the National Association of Purchasing Agents, and as editor of the *Purchasing Magazine*.

The book is divided into 5 parts, the first of which is devoted to information on "Organization for Purchasing," Part II on "Purchasing Principles," Part III "Purchasing Procedures," Part IV "Tools of Purchasing," and Part V "Purchasing Policies."

Learning to Letter in One-Stroke Gothic

By Ernest L. Bowman. Paper, 61 pp., 6 by 6 in., illus., 52 cents. The Manual Arts Press, Peoria 3, Ill.

This revised edition presents opportunities for the students to learn how to do good slant or vertical lettering.

The author has developed a good method for spacing. Both upper case and lower case alphabets are presented, and the ruled pages give the student ample space for practice.

(Continued on next page)

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2 **MASONRY SIMPLIFIED, Vol. II — Practical Construction.** The practical methods of constructing each detail of a structure. Completely illustrated. Ready Jan. 6, 1948

3 **FUNDAMENTALS OF CARPENTRY, Vol. I — Tools, Materials, Practice.** Durbahn. This newcomer to our popular building trades series presents the fundamentals in "teachable" form for the beginner and the apprentice. The organization is flexible, making it easily adaptable to a wide variety of training programs. Price $3.25

4 **FUNDAMENTALS OF CARPENTRY, Vol. II — Practical Construction.** Modern methods of construction elaborately illustrated. Ready Jan. 6, 1948

5 **HOW TO READ FOR SELF-IMPROVEMENT.** Levin. Developed to overcome the difficulties experienced by the poor reader. Stimulates the desire to read, improves the ability to concentrate, increases the reading speed, and develops the power of retention. A complete "working plan" for vocational schools. Price $2.75

6 **DICTIONARY OF CARPENTRY TERMS.** Durbahn-Dalzell. The terms of the carpentry trade and related fields concisely defined in the language of the trade. Price $.75

7 **TOOL AND DIE DESIGN — STUDY GUIDE.** A new addition to our popular series of Study Guides. Includes assignments in standard texts, study questions, self-check questions, and comprehensive examinations. Price $1.50

8 **TRANSFORMERS.** Dunlap-Siefert-Austin. The authors, who are all authorities in this field, have presented a thorough treatment of the subject as applied to the problems of the practical man. Price $2.75

9 **DIRECT CURRENT MOTORS AND GENERATORS.** McDougal-Keith-Ranson. The fundamental and advanced principles presented in understandable terms. Price $3.00

Please send me the books circled below on 30 days examination. If any of the books are adopted and 12 or more copies ordered, I will retain the adopted books as desk copies; otherwise, I will return them or remit less the educational discount.

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(Continued from previous page)

Illustrated Jig-Tooling Dictionary

By Torger G. Thompson and Ross A. Peterson. Cloth, 349 pp., 6¼ by 9⅜ in., $7.50. The Macmillian Co., New York, N. Y.

A dictionary in which each definition is illustrated, for learners, apprentices, toolmakers, tool engineers, and tool designers. It presents the latest industrial precision equipment, typical tooling processes, and construction methods.

The book is the work of an expert production illustrator who has formerly been a tool designer, and an educational expert who is now director of a trade school.

The book also contains an index containing a number of tables useful to the designer and to the toolmaker.

Testing in Modern Industry

Cloth, 105 pp., 5¼ by 8¼ in., illus. Prepared by United States Testing Co., Hoboken, N. J.

An explanation of what and how modern industry can obtain from and through the testing company information about the content, quality, and strength of the raw materials that go into its manufactured products.

Organization and Management in Industry and Business

By William B. Cornell. Cloth, 819 pp., 6⅜ by 9¼ in., illus., $5. Ronald Press Co., New York 10, N. Y.

This is the third edition of this voluminous text which deals with the principles of organization and management, charting the organization, making analyses, management of the personnel, production control, making time studies, and the like.

The book also gives some good illustrations from actual practice, and a comprehensive bibliography.

The Story of Wool

By William F. Leggett. Cloth, 304 pp., 5¼ by 7¾ in., illus., $5. Chemical Publishing Co. Inc., Brooklyn, N. Y.

A very fine, interesting story telling the history of wool, and its gradual development from ancient times down to our own days. It also tells of the attempts made to improve sheep breeds by cross breeding, and of progress made in spinning and weaving from the days of Egypt and India, down through the European countries, North and South America, and then Australia.

Then came the discovery that wool could be dyed with various kinds of dyes, and that the hair and fur obtained from other animals could be used for making fur. All of this interestingly told in this book.

Palmetto Braiding and Weaving

By Viva Cooke and Julia Sampley. Cloth, 127 pp., 6⅜ by 9¼ in., illus., $2.75. The Manual Arts Press, Peoria, Ill.

A book on an interesting hobby. The authors have gone to quite a bit of trouble to collect as many as possible of the various braids that have been developed in this country.

Full directions are given for preparing the braiding material; how to braid; various types of braids; spirals; how to make buttons, patterns, and color combinations; how to sew braids; and how to make baskets, favors, fans, and mats.

Adult Education for Homemaking

By L. Belle Pollard. Cloth, 194 pp., 5¾ by 8⅝ in., $2.75. John Wiley & Sons, New York, N. Y.

A college textbook on the subject of how to organize and teach homemaking subjects.

The book treats of the educational values of homemaking education for adults, the objectives of this subject, the personality of the good homemaking teacher, how to publicize homemaking courses for adults, how to plan the course, the procedures to follow in order to facilitate learning, and how to evaluate the work that is being or has been done.

A sizable bibliography has been made a part of the book.

Practical Job Pointers

By Nelson L. Burbank. Cloth, 211 pp., 8⅝ by 11¼ in., illus., $4. Simmons-Boardman Publishing Corp., New York, N. Y.

A compilation of about 600 practical ideas which readers of the *American Builder and Building Age* have contributed during the past decade.

These pointers have been contributed by men who have found them helpful in their practical work. They should be very helpful to teachers and students in classes in which building trades subjects are taught.

Sheet Metal Mathematics

Compiled by Eugene D. Fink, chairman of New York State Committee of Instructors of the Buffalo Vocational Schools. Paper, loose leaf, 263 pp., 8 by 10½ in., illus. Delmar Publishers, Inc., Albany, N. Y.

A book giving a thorough review of elementary arithmetic, simple equations, mensuration, and trigonometry, all applied to practical problems taken from the sheet-metal trades.

The appendix contains some handy reference tables and a good bibliography.

Work and Effort: The Psychology of Production

By Thomas Arthur Ryan. Cloth, 323 pp., 6 by 9¼ in., $4.50. The Ronald Press Co., New York, N. Y.

A survey of the progress made in the field of the psychology of production. This research includes a study of how light, heat, ventilation, monotony, and fatigue affect the worker.

The material is presented under the following heads: the meaning of efficiency, cost of work, fatigue in sedentary work, physiological tests of effort and fatigue, factors which govern efficiency and productivity of work, work methods and efficiency, incentives and motives, time standards and rate setting, merit rating and job evaluation, accident control, and skill and practice.

Candlemaking

By William W. Klenke. Cloth, 80 pp., 5⅝ by 8⅛ in., illus., $2. The Manual Arts Press, Peoria, Ill.

An interesting book on an interesting subject which will please many hobbyists.

There are five chapters which give information and formulas about waxes, wicking, hand dipping, casting candles in molds, how to use fresh and waste wax, how to color and scent it.

Problems in Drafting and Design

By Francis L. Goff. Paper cover, 117 pp., 6¼ by 10¼ in., illus., $1. McKnight & McKnight, Bloomington, Ill.

This book was written by the chief draftsman of an industrial firm who has had experience in training and supervising many draftsmen and designers. He also has taught drafting in high school and college.

The book contains 50 problems which have been specially selected to make the study of drafting interesting to the beginner. All of the problems have been taken from the field of aircraft manufacturing.

The Light Metals Industry

By Josephine Perry. Cloth, 128 pp., 6⅜ by 8⅜ in., illus., $2. Longmans, Green & Co., New York, N. Y.

An interesting book on the history and manufacture of aluminum and magnesium, how these metals are used in the production of various alloys, and the uses to which these light metals are put in our modern mechanical age.

We Can Have Better Schools

By Maxwell S. Stewart. Public Affairs Pamphlet No. 112, 32 pp., 5⅜ by 8⅜ in., illus., 10 cents. Public Affairs Committee, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

Keeping Up With Teen-Agers

By Evelyn Millis Duvall. Public Affairs Pamphlet No. 127, 32 pp., 5⅜ by 8⅜ in., illus., 10 cents. Public Affairs Committee, Inc., 30 Rockefeller Plaza, New York, N. Y.

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This popular textbook has been adopted by more than 300 school systems in all parts of the country. The original edition was among the first textbooks for general shop use. Written primarily in the language of high school pupils, the logical relation between the "know what" and the "know how" is developed by means of 148 jobs, which introduce pupils to many household maintenance and repair problems. Preceding each job the essential information for doing the work will be found. Step-by-step procedures guide the pupils in developing good habits of work, and at the same time there is a skillfully arranged set of questions and self-appraisal guides which insure a maximum amount of pupil problem solving.

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CUP AND SAUCER RACK

(Continued from page 14A)

Next, a round recess is carved into the shelf ⅛ in. deep, which will accommodate the base of the cup snugly. At least ¼ in. of space should remain between the front edge of the shelf and the front edge of the recess.

Cup and saucer rack

Now assemble the three wooden pieces with glue and brads.

The metal saucer supports hold the saucer safely so that it can neither roll nor fall. No. 18-gauge copper is suitable for making the supports which may be finished in color by oxidizing, or they may be simply polished and lacquered. The saucer is then used to get an actual fitting for the supports as they are fastened in place with No. 4 by ⅜-in. r.h. brass screws.

Any desirable finish may be used which will be suited to the type of wood used.

Two or three small finishing nails are used to secure the rack to the wall. The nails become almost concealed if they are slanted downward at about 45 deg. through the joint at the rear of the shelf. A small pilot hole should be drilled first and then the nails may be easily driven into place, and then seated with a nail set.

PERSONAL NEWS

(Continued from page 16A)

the army in 1941 and spent five years at active duty, 25 months of which were overseas. Upon discharge, he returned to Columbia University where he completed the work for his master's degree.

♦ HAROLD GILBERT, a native of Buffalo, N. Y., has been appointed instructor of general metal at the State Teachers College at Oswego, N. Y. Mr. Gilbert received his B.S. in education from the Buffalo State Teachers College in 1938. He then accepted a general shop teaching position in Holly, N. Y., where he taught for two years before entering the army. In the army, Mr. Gilbert served with the construction engineers, with service in both Okinawa and Korea before his discharge in 1946.

Upon returning to civilian life, Mr. Gilbert enrolled in the Ohio State University where he received his M.A. degree in August, 1947.

♦ CLELL M. COX has been appointed assistant professor of art and industrial arts at the Burrus Laboratory School, Ball State Teachers College, Muncie, Ind. He received both his B.S. and M.A. degrees at Ohio State University. Mr. Cox has taught evening classes, one year in the University School, Ohio State University, and two years in the Shrinenaam American University, England.

♦ EARL L. BEDELL, director of vocational education, Detroit, Mich., gave the commencement address at The Stout Institute in June.

He lectured, during the summer session, at Utah A. & M. College, Logan, Utah.

♦ RALPH ROGERS has been appointed machine-shop instructor at the Indiana Technical College, Fort Wayne, Ind.

♦ H. J. SUTHERLAND of Washington Vocational High School, Pittsburgh, Pa., was recently appointed vice-principal of Perry High School.

♦ FRANK JAMISON of Somers Trade School, Pittsburgh, Pa., was honored by a dinner at the downtown "Y," on the occasion of his retirement.

♦ BILL SELLON is teaching welding and machine-shop work at Oklahoma University, Norman, Okla. He also is taking graduate work at the same university.

♦ Mu Sigma Pi members who completed the work for the M.A. degree during the 1947 summer session at Wayne University, Detroit, Mich., are: WALTER O. BREED, WALTER BILLIET, OLIVER LUEY, STANLEY FILIPIAK, ERNEST COVERDILL, and ARTHUR ELGES.

(Continued on page 30A)

Shop Equipment News

NEW PRODUCTS — PUBLICATIONS

NEWEST PERENY ELECTRIC FURNACE

A new-type, electric pot furnace to meet the requirements necessary for better castings of nonferrous metals, has just been announced by the Pereny Equipment Co., Columbus, Ohio. The new electric melting furnace, known as Model PF-2121, is equipped to provide accurate heat control, a necessary factor in developing the finest physical and chemical properties when melting aluminum, brass, and bronze.

New Pereny electric furnace

With this furnace it is possible to ladle the molten metal direct from the unit into die-cast machines, or to remove the crucible with tongs. The furnace has a working capacity of 275 lbs., in aluminum (Tercod Crucible No. 300 or equal).

The over-all dimensions of the unit are 49¾ in. wide, 37¼ in. deep, and 44⅛ in. high. The maximum power input is rated as 34.3 kw.

In addition this new furnace, the Pereco line, contains many standard and special electric forge and heat-treating furnaces up to 2700 deg. F.

For brief reference use IAVE — 0101.

7-IN. AMMCO SHAPER

The 7-in. shaper designed for shop production work, toolmakers, and school shops, has the accuracy and operating features of larger shapers. On jobs requiring a stroke of 7 in. or less, this shaper will save much setup time and expense.

The ways of the ram, toolhead, and front face of the main frame are of the V type. The toolhead is adjustable and graduated from 0 to 90 deg. for angle work, and is quickly loosened or tightened by one screw. The down feed screw is provided with a graduated collar for adjustment.

The vise is made of semisteel and is mounted on the table with a single bolt, and is held in position with a key. The base is graduated for any angle from 0 to 90 deg. on either side of center.

The feed mechanism is of the reversible and adjustable type. By adjusting the position of the T bolt in the feed adjusting lever, a feed varying from .003 in. to .018 can be obtained.

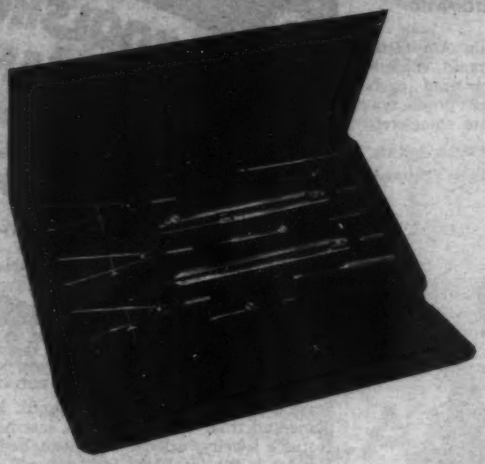
7-in. Ammco shaper

The adjustable countershaft has a 4-step V pulley with separate adjustment for V belt and motor belt. Pulleys and belt can be enclosed behind hinge-type safety-belt guard for quick change of belt.

For more explicit information, write to Ammco Tools Co. Inc., Commonwealth Ave., North Chicago, Ill.

For brief reference use IAVE — 0102.

(Continued on page 28A)



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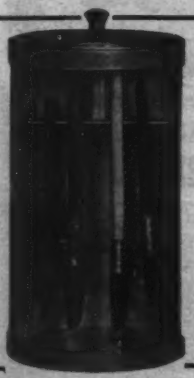

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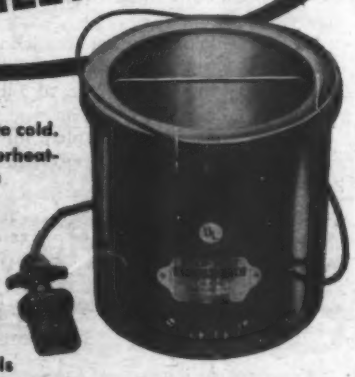

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(Continued from page 26A)

CINCINNATI NO. 0–8 PLAIN AUTOMATIC MILLING MACHINE

The new Cincinnati No. 0–8 Plain Automatic Milling Machine was designed for rapid, efficient production of small- and medium-sized parts manufactured in medium to large production quantities. Table operating cycles are completely

Cincinnati No. 8–0 plain automatic milling machine

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Twenty spindle speeds are available, ranging from 80 to 3000 r.p.m. Sixteen feeds are supplied, ranging from ½ to 20 in. per minute with optional ranges from 1 to 40 in., or 2 to 80 in. p.m. Automatic backlash eliminator, automatic spindle stop, and spindle reverse are supplied. Catalog may be obtained by writing The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

For brief reference use IAVE — 0103.

CRAFT SUPPLIES CATALOG

The fall and winter 1947–48 catalog of craft supplies, published by the American Handicrafts Co. Inc., 45–49 South Harrison St., East Orange, N. J., is now available.

It covers leathercraft, metalcraft, pottery, raffia, beadcraft, shellcraft, Plexiglas, block printing, felt, wood burning, knotting and weaving, aluminum kits, whittlers' supplies, and the like.

For brief reference use IAVE — 0104.

SLIDE FILMS ON TECHNICAL LETTERING

The Jam Handy Organization, 2821 East Grand Blvd., Detroit 11, Mich., have produced a new kit of slide films on "Technical Lettering."

Each of the five slide films which make up the kit is organized into lessons on groups of letters produced with similar strokes. Alternate strokes for left-handers also are given.

Individual slide films also are available.

For brief reference use IAVE — 0105.

NEW COMMERCIAL STANDARD FOR DOUGLAS FIR PLYWOOD

Effective Sept. 15, 1947, Douglas Fir Plywood Association, Tacoma Bldg., Tacoma 2, Wash., will produce all of its plywood in accordance with the new performance standards established by the industry through U. S. Department of Commerce, Bureau of Standards, to be known as United States Commercial Standard CS45–47.

Copies of the standard may be obtained by writing to the association.

For brief reference use IAVE — 0106.

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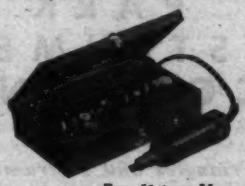

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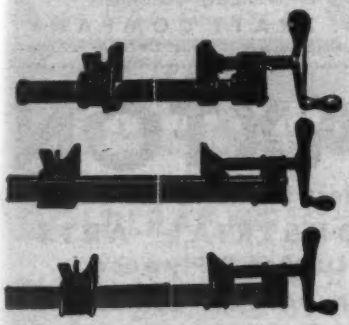

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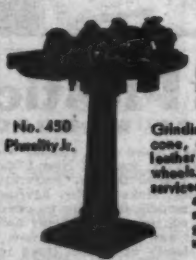

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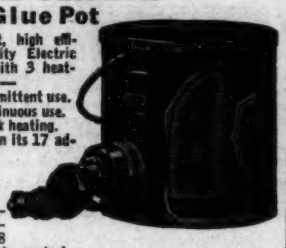

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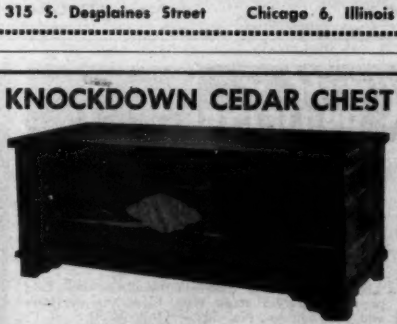

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PERSONAL NEWS

(Continued from page 26A)

♦ WILLIAM T. SARGEANT recently received the M.A. degree from the vocational department at Wayne University, Detroit, Mich.

He has joined the faculty of Northern Michigan College of Education, Marquette, Mich.

♦ KERMIT HAAS has been appointed teacher of printing at Thomas Jefferson High School, Council Bluffs, Iowa.

♦ The following men have completed the work for a master's degree with a major in industrial education in September of this past year, at Wayne Uuiversity, Detroit, Mich.: Walter E. Billiet, Walter O. Breed, Lincoln C. Browning, Ernest Coverdill, Arthur J. Elges, Stanley C. Filipiak, Richard E. Gieble, Fred A. Knack, Oliver Luey, Owen J. Mesner, Frederick Preator, Paul L. Reber, and Michael Wichorek.

♦ FLOYD LARSON has been elected executive secretary of the National Association for Printing Education. At present this organization is busily engaged in a membership campaign to bring the membership total up to the high level that it enjoyed previous to the war.

♦ ISRAEL BENSMAN, head of the printing department of the Sheboygan High School, Sheboygan, Wis., was recently elected president of the National Association for Printing Education. Mr. Bensman has been active in this association of printing teachers for a number of years.

♦ BOB NERBUN is in charge of the printing department of the public schools at Menominee, Mich.

♦ DONALD BLACK has been appointed drafting department head at Cass Technical High School, Detroit, Mich. He assumed his responsibilities in September.

♦ WILLIAM HAWLEY is completing his work for the master's degree at Wayne University, Detroit, Mich. Industrial education teachers in Michigan will be interested in his thesis entitled "The Development of Industrial Education in Michigan in the Period 1940–47."

♦ G. HAROLD SILVIUS presented a paper at the recent Manual Arts Conference, entitled "Graduate Programs for Industrial Arts Teachers." This conference was held in Chicago, Ill., at the LaSalle Hotel on November 13 to 15.

The name of this conference has now been changed to The Industrial Arts Conference of the Mississippi Valley. Dr. Verne Fryklund is permanent life chairman.

♦ THEODORE KUEMMERLEIN has been appointed supervisor of guidance in the public schools of Milwaukee, Wis.

Mr. Kummerlein will direct welfare and psychological counseling as well as general educational and vocational guidance.

He was vice-president of Boys' Trade and Technical high school for the past two years.

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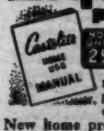

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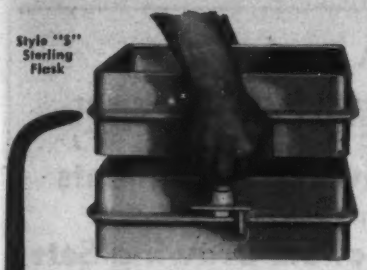

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13	110	117	124	131	138	145	151	157	163	169	175
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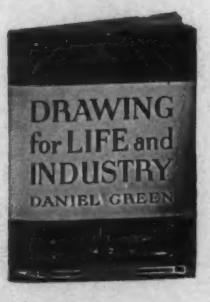

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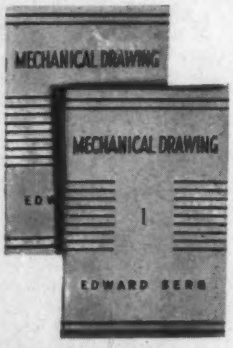

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